Department of Environmental Quality
Division of INL Oversight
and Radiation Control

ENVIRONMENTAL SURVEILLANCE PROGRAM QUARTERLY DATA REPORT

April - June, 2005

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Division of INL Oversight and Radiation Control

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Table of Acronyms

BEA - Battelle Energy Alliance, LLC
CERCLA - Comprehensive Environmental Response Compensation and Liability Act
CFA - Central Facilities Area
CWI - CH2M-WG Idaho, LLC
DEQ-INL - The State of Idaho, Division of Idaho National Laboratory Oversight and Radiation Control
DOE - U.S. Department of Energy
EIC - electret ionization chamber
EML - Environmental Monitoring Laboratory
EPA - Environmental Protection Agency
ESER - Environmental Surveillance Education and Research Program (SM Stoller)
ESP - Environmental Surveillance Program
HPIC - high-pressure ion chamber
LLD - lower limit of detection
IBL - Idaho Bureau of Laboratories
INL - Idaho National Laboratory
INTEC - Idaho Nuclear Technology and Engineering Center
LSC - liquid scintillation counting
MFC - Materials and Fuels Complex
µg/L - micrograms per liter
mg/L - milligrams per liter
mR/hr - milliRoentgen per hour
µR/hr - microRoentgen per hour
MCL - maximum contaminate level
MDA - minimum detectable activity
MDC - minimum detectable concentration
NIST - National Institute of Standards and Technology
nCi/L - nanocuries per liter
NOAA - National Oceanic and Atmospheric Administration
NRF - Naval Reactors Facility
pCi/L - picocuries per liter
pCi/m^3 - picocuries per cubic meter
PM_{10} - particulate matter with aero-dynamic diameter less than or equal to 10 micrometers
PCE - perchloroethene
QAPP - Quality Assurance Program Plan
QA/QC - Quality Assurance/Quality Control
RCRA - Resource Conservation and Recovery Act
RPD - relative percent difference
RWMC - Radioactive Waste Management Complex
RTC - Reactor Technology Complex
SD - standard deviation
SMCL - secondary maximum contaminant level
TAN - Test Area North
TCE - trichloroethene
TDS - total dissolved solids
TMI - Three Mile Island
TSP - total suspended particulate
TSS - total suspended solids
USGS - U.S. Geological Survey
VOC - volatile organic compound
WLAP - Wastewater Land Application

Introduction

The state of Idaho, Division of Idaho National Laboratory Oversight and Radiation Control (DEQ-INL) Environmental Surveillance Program (ESP) is conducted at locations on the INL, on the boundaries of the INL, and at distant locations to the INL in accordance with accepted monitoring procedures and management practices. This program is designed to provide the people of the state of Idaho with indepen-ently evaluated information about the impacts of the Department of Energy's (DOE) activities in Idaho.

The primary objective for DEQ-INL's ESP is to maintain an independent environmental monitoring and verification program designed to verify and supplement DOE's data and programs. This program is also used to provide the citizens of Idaho with information that has been independently evaluated to enable them to reach informed conclusions about DOE activities in Idaho and potential impacts to public health and the environment.

Results of the ESP are published using two distinct reporting formats: quarterly data reports and an annual ESP report. The annual ESP report is designed for a more broad audience and summarizes the results of the ESP for the previous four quarters. The annual report's primary emphasis is to focus on trends, ascertain the impacts of DOE operations on the environment, and confirm the validity of DOE monitoring programs. This quarterly report is designed to provide the mechanism to document the results of the ESP on a quarterly basis and provide detailed data to those who wish to "see the numbers." It is organized according to the media sampled and also provides a quality assurance assessment.

Air and Precipitation Monitoring Results

The ESP operated eight air monitoring stations on and near the INL as well as two monitoring stations distant from the INL during the second quarter, 2005 (**Figure 1**). These stations employed instrumentation for collecting airborne particulate matter (TSP and PM_{10}), gaseous radioiodine, precipitation, and water vapor for tritium analysis (**Table 1**). The Shoshone-Bannock Tribes operated an air monitoring station located at Fort Hall. The Fort Hall station uses identical instrumentation and sampling protocol as the ten stations operated by the ESP. The DEQ-INL reports the Fort Hall station data as an additional background site.

The high-volume total suspended particulate (TSP) air sampler is the DEQ-INL's primary air sampler. During the second quarter of 2005, one PM_{10} sampler collected supplementary air data, along with radioiodine at Mud Lake. The second quarter of 2005 will be the last quarter the PM_{10} samplers are run.

Weekly gross alpha and gross beta radioactivity results for filters from the TSP samplers are presented in **Appendix A** and summarized in **Table 2**. Gross alpha and gross beta radioactivity concentrations reported from the particulate samples were within the range of expected values for naturally-ccurring radioactivity observed historically.

Weekly gross alpha and gross beta radioactivity results for the PM_{10} particulate air filters are presented in **Appendix B** and summarized in **Table 3**. Gross alpha and gross beta radioactivity concentrations reported from the particulate samples were within the range of expected values for naturally occurring radioactivity.

Composites of filters collected using TSP and PM_{10} samplers during the course of a calendar quarter are analyzed using gamma spectroscopy. Typically, gamma spectroscopy results are only reported when exceeding a minimum detectable activity (MDA) or minimum detectable concentration (MDC). Gamma spectroscopy results for the second quarter of 2005 for TSP filters are presented in **Table 4** and gamma

spectroscopy results for PM_{10} filters are presented in **Table 5**. The only reported gamma-emitting radionuclide was beryllium-7, a naturally occurring, cosmogenic radionuclide.

No radioactive isotopes of iodine, specifically iodine-131, were detected on the weekly charcoal cartridges.

Atmospheric moisture samples were collected at 11 locations and analyzed for tritium. Atmospheric tritium concentrations were determined using the amount of tritium measured in the atmospheric moisture collected, the quantity of atmospheric moisture collected, and the volume of air sampled. Reported values are the result of either a single sample or a weighted mean when more than one atmospheric moisture sample was collected during the calendar quarter. No atmospheric tritium was measured at on-site or off-site locations during the second quarter of 2005. Average atmospheric tritium concentrations are presented in **Table 6**.

Precipitation samples were collected at six monitoring locations during the second quarter of 2005. Precipitation samples are analyzed for tritium and gamma-emitting radionuclides. Tritium and gamma-emitting radionuclides were below minimum detectable concentration in precipitation collected during the second quarter of 2005. Tritium and cesium-137 analysis results are presented in **Table 7**. Reported values are either the result of a single sample or a weighted mean when more than one precipitation sample was collected during the calendar quarter.

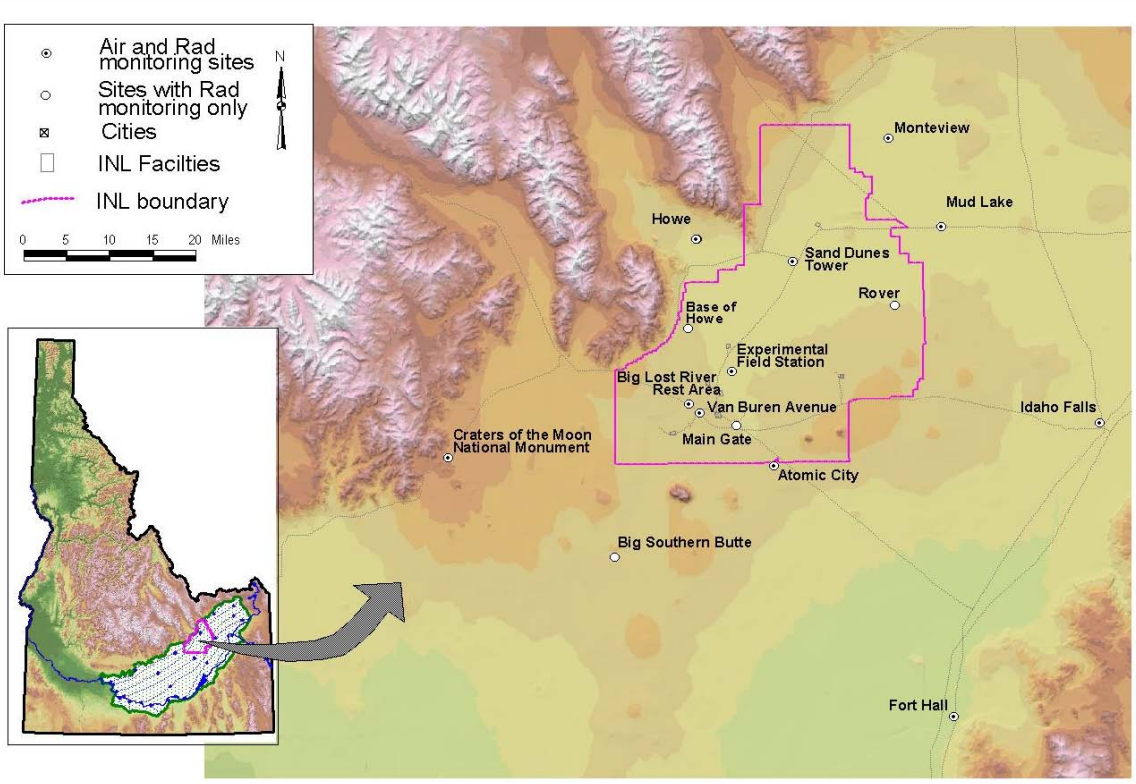

Figure 1. Air and radiation monitoring sites.

Table 1. Sampling locations and sample type.

Station Locations	Sample type[1]				
	PM_{10}	TSP	Radioiodine	Water Vapor	Precipitation
On-site Locations					
Big Lost River Rest Area		□	□	■	■
Experimental Field Station		□	□	■	
Sand Dunes Tower		□	□	■	
Van Buren Avenue		□	□	■	
Boundary Locations					
Atomic City		□	□	■	■
Howe		□	□	■	■
Monteview		□	□	■	■
Mud Lake	□	□	□	■	■
Distant Locations					
Craters of the Moon		□	□	■	
Fort Hall[2]		□	□	■	
Idaho Falls		□	□	■	■

[1] □ Samples collected weekly; ■ Samples collected quarterly.
[2] Operated by Shoshone-Bannock Tribes.

Table 2. Range of alpha and beta concentrations for TSP filters, second quarter, 2005. Concentrations are reported in 1x 10^{-3} pCi/m^3.

Station Location	Concentration					
	Gross Alpha			Gross Beta		
On-Site Locations						
Big Lost River Rest Area	0.3	-	1.6	9.8	-	25.8
Experimental Field Station	0.2	-	2.0	10.2	-	24.8
Sand Dunes Tower	0.0	-	1.0	9.3	-	23.9
Van Buren Avenue	0.1	-	1.3	10.6	-	27.1
Boundary Locations						
Atomic City	0.4	-	1.1	12.1	-	31.1
Howe	0.2	-	1.4	9.9	-	25.4
Monteview	0.2	-	1.6	10.6	-	22.7
Mud Lake	0.2	-	1.2	9.8	-	24.4
Distant Locations						
Craters of the Moon	0.0	-	0.8	9.1	-	21.8
Fort Hall[1]	0.4	-	1.8	9.9	-	21.5
Idaho Falls	0.3	-	1.8	10.3	-	25.5

[1] Operated by Shoshone-Bannock Tribes.

Table 3. Range of alpha and beta concentrations for PM_{10} filters, second quarter, 2005. Concentrations are reported in 1x 10^{-3} pCi/m^3.

Station Location	Concentration	
	Gross Alpha	Gross Beta
Boundary Locations		
Mud Lake	-0.1 - 1.7	10.2 - 25.6

Table 4. Gamma spectroscopy analysis data of TSP filters, composite sample, second quarter, 2005. Concentrations are reported in 1 x 10^{-3} pCi/m^3 with associated uncertainty (**±** 2 SD), minimum detectable concentration (MDC), and correspond to filter composites collected during the calendar quarter.

Station Location	Naturally Occurring Radionuclide Beryllium-7		Man-Made Gamma Emitting Radionuclides
	Concentration	± 2 SD	
On-site Locations			
Big Lost River Rest Area	91	5	<MDC
Experimental Field Station	77	4	<MDC
Sand Dunes Tower	76	4	<MDC
Van Buren Avenue	96	5	<MDC
Boundary Locations			
Atomic City	101	5	<MDC
Howe	86	5	<MDC
Monteview	77	4	<MDC
Mud Lake	77	4	<MDC
Distant Locations			
Craters of the Moon	74	4	<MDC
Fort Hall[1]	79	4	<MDC
Idaho Falls	83	4	<MDC

[1] Operated by Shoshone-Bannock Tribes.

Table 5. Gamma spectroscopy analysis data of PM_{10} filters, composite sample, second quarter, 2005. Concentrations are reported in 1 x 10^{-3} pCi/m^3 with associated uncertainty (**±** 2 SD), minimum detectable concentration (MDC), and correspond to filter composites collected during the calendar quarter.

Station Location	Naturally Occurring Radionuclide Beryllium-7		Man-Made Gamma Emitting Radionuclides
	Concentration	± 2 SD	
Boundary Locations			
Mud Lake	91	5	<MDC

Table 6. Tritium concentrations from atmospheric moisture, second quarter, 2005. Concentrations are reported in pCi/m^3 with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).

Station Location	Tritium		
	Concentration	± 2 SD	MDC
On-site Locations			
Big Lost River Rest Area	0.21	0.18	0.30
Experimental Field Station	0.10	0.22	0.38
Sand Dunes Tower	0.05	0.19	0.33
Van Buren Avenue	0.18	0.21	0.35
Boundary Locations			
Atomic City	0.01	0.21	0.36
Howe	0.04	0.18	0.33
Mud Lake	0.02	0.20	0.34
Monteview	0.01	0.21	0.35
Distant Locations			
Craters of the Moon	0.01	0.16	0.29
Fort Hall	0.11	0.19	0.32
Idaho Falls	0.08	0.19	0.33

Table 7. Tritium and cesium-137 concentrations from precipitation, first quarter, 2005. Concentrations are reported in pCi/L with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).

Station Location	Tritium			Cesium-137		
	Concentration	± 2 SD	MDC	Concentration	± 2 SD	MDC
On-site Locations						
Big Lost River Rest Area	56	70	117	0.85	1.79	3.02
Boundary Locations						
Atomic City	38	74	117	-1.15	1.51	2.74
Howe	59	72	114	-0.49	1.54	2.72
Monteview	-33	66	119	-0.60	1.40	2.47
Mud Lake	60	73	117	0.13	1.47	2.50
Distant Locations						
Idaho Falls	20	75	120	0.25	1.60	2.70

Environmental Radiation Monitoring Results

The ESP operated 14 environmental radiation stations during the second quarter of 2005 **(Figure 1)**. Each of these stations is instrumented with an electret ionization chamber (EIC), and 11 of the stations also have high-pressure ion chambers (HPIC) **(Table 8)**. The Shoshone-Bannock Tribes operate an additional environmental radiation station at Fort Hall equipped with both an EIC and HPIC. The DEQ-INL reports these results.

HPICs are instruments capable of real-time measurements, and therefore can detect small changes in gamma radiation levels over time. Since HPICs offer real-time gamma radiation measurement and data acquisition, DEQ-INL collects this information electronically and provides graphed data via the world wide web at www.idahoop.org. EICs are a passive-integrating system that provides a cumulative measure of environmental gamma radiation exposure. DEQ-INL compared the exposure rates measured by EICs and HPICs and observed that the data correlated very well from both measurement methods; although, EICs tend to over respond by approximately 20 percent, accounting for the slight differences observed between the two measurements. A complete analysis of the radiation measuring devices can be found in *A Comparison of Three Methods for Measuring Environmental Radiation*, Moser, Kristi, Idaho State University, M.S.Thesis, 2002. Each system is used by DEQ-INL to measure gamma radiation for various radiological monitoring objectives. EICs offer an inexpensive methodology to measure gamma radiation over a wide area, particularly in regions which do not have a power source. EICs can also provide valuable gamma radiation data in the event of an emergency. It is because of this reason that EICs are also deployed at 78 locations by DEQ-INL in a widespread network around the INL measuring general background radiation. This information is tabulated in **Appendix C.**

Table 9 lists the average radiation exposure rates measured by the HPICs for the quarter. Exposure rates were within the expected historical range of values observed by DEQ-INLfor background radiation. **Table 10** lists the EIC monitoring results for second quarter, 2005.

Table 8. Summary of instrumentation at radiation monitoring stations.

Station Location	Instrument Type	
	HPIC	EIC
On-site Locations		
Base of Howe	■	■
Big Lost River Rest Area	■	■
Experimental Field Station		■
Main Gate	■	■
Rover	■	■
Sand Dunes Tower	■	■
Van Buren Avenue		■
Boundary Locations		
Atomic City	■	■
Big Southern Butte	■	■
Howe	■	■
Monteview	■	■
Mud Lake	■	■
Distant Locations		
Craters of the Moon		■
Fort Hall[1]	■	■
Idaho Falls	■	■

[1] HPIC operated by Shoshone-Bannock Tribes with the EIC maintained by DEQ-INL.

Table 9. Average gamma exposure rates for second quarter, 2005, from HPIC network. These rates are expressed in µR/hr.

	Exposure Rate	
	Quarterly Average	**± 2 SD**
On-site Locations		
Base of Howe	12.4	0.8
Big Lost River Rest Area	14.5	1.8
Main Gate	14.0	0.9
Rover	13.9	0.8
Sand Dunes Tower	14.1	1.3
Boundary Locations		
Atomic City	13.1	0.8
Big Southern Butte	13.8	0.9
Howe	12.4	0.8
Monteview	12.0	0.8
Mud Lake	12.3	0.8
Distant Locations		
Fort Hall[1]	12.4	0.9
Idaho Falls	11.4	0.7

[1] Operated by Shoshone-Bannock Tribes.

Table 10. Electret ionization chamber (EIC) cumulative average exposure rates[1] for second quarter, 2005. These rates are expressed in µR/hr.

Station Location	Exposure Rate	
	Total	**± 2 SD**
On-site Locations		
Base of Howe	17.3	2.0
Big Lost River Rest Area	16.8	1.9
Experimental Field Station	21.3	2.0
Main Gate	17.9	1.9
Rover	19.2	2.1
Sand Dunes Tower	20.0	2.0
Van Buren Avenue	21.1	2.0
Boundary Locations		
Atomic City	17.0	1.9
Big Southern Butte	15.9	1.5
Howe	13.9	1.8
Monteview	16.6	1.9
Mud Lake	16.3	1.9
Distant Locations		
Craters of the Moon	17.0	1.9
Fort Hall	15.6	1.8
Idaho Falls	15.6	1.8

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Water Monitoring & Verification Results

Water Monitoring Program

Water monitoring sites are sampled for the primary purpose of examining trends of key INL contaminants and of general groundwater quality indicators. These sites are grouped by location; on the INL or its boundary, off-site and distant from the INL, and surface water sites. Sites are typically co-sampled with the USGS or DOE's environmental monitoring contractor. Twenty-four water monitoring locations were sampled during the second quarter of 2005; 14 locations on or bounding the INL, 8 locations off-site or distant from the INL, and 2 surface water sites. (**Figure 2**).

Gross alpha radioactivity was detected in one sample on-site, USGS-027 (4.5 ± 2.7 pCi/L), and one sample off-site, Clear Spring Hatchery (3.4 ± 2.1 pCi/L). Gross beta radioactivity was detected in all but one on-site sample for the second quarter. Detectable gross beta activity ranged from 1.7 ± 0.9 to 9.7 ± 1.2 pCi/L for on-site and boundary locations, 2.3 ± 0.9 to 6.6 ± 1.1 pCi/L for off-site and distant locations, and 2.1 ± 0.9 to 2.3 ± 0.9 for surface water sites. The concentrations of gross alpha and gross beta radioactivity were consistent with historical results and were within expected ranges. No man-made gamma emitting radionuclides were identified via gamma spectroscopic analysis. Results for gross alpha, gross beta, and man-made gamma emitting radioactivity are shown in **Table 11.**

Gross alpha and gross beta analyses are conducted as a screening tool for alpha and beta emitting radionuclides potentially released due to INL operations. Selected sites are sampled for the man-made, beta emitting radionuclides, technetium-99 and strontium-90, based on historic INL contamination. In the event of suspect, high, or unexpected levels of gross radioactivity, additional samples may also be analyzed for other specific radionuclides.

Five locations were sampled for technetium-99, with concentrations from all sites exceeding the detection level of 0.2 -0.3 pCi/L. Technetium-99 was released to the environment at the INL by reprocessing spent nuclear fuel, and does not occur naturally in groundwater of the Eastern Snake River Plain. The EPA maximum contaminant level (MCL) for technietium-99, based on the 4 millirem per year criteria, is 900 pCi/L.

Three locations were sampled for strontium-90, with one site returning a result above detectable levels; USGS-085 (3.28 ± 0.9 pCi/L). The EPA MCL for strontium-90 is 8 pCi/L. Results for technetium-99 and strontium-90 are found in **Tables 12** and **13,** respectively.

Using the standard analytical method, tritium was detected in five samples from on-site and boundary locations (**Table 14**). On-site and boundary sample results with detectable tritium ranged from 820 ±100 to 7780 ± 230 pCi/L. Water samples with tritium concentrations not measurable using the standard method (MDC of 160 pCi/L) are analyzed using an electrolytic enrichment method with a much lower MDC of 10 to 14 pCi/L. The analytical results for these samples are presented in **Table 15**. Tritium was detected in samples on and off-site using the electrolytic enrichment method, and ranged from 11 ± 6 pCi/L to 54 ± 8 pCi/L on-site and 13 ± 7 to 109 ± 9 off-site. The result for one site, USGS-124 (109 ± 9 pCi/L), is indicative of INL historic contamination. All other results were within their expected ranges and were below the MCL for tritium of 20,000 pCi/L.

Water samples were also analyzed for metals and the results are shown in **Table 16.** While barium concentrations ranged from 26 to 91 µg/L on-site, 31 to 50 µg/L off-site and 61 µg/L for surface water sites, all were less than the MCL of 2,000 µg/L and within expected ranges. Detectable chromium concentrations ranged from 6 to 96 µg/L on-site. which are below the MCL of 100 µg/L. Concentrations

above 5 µg/L are indicative of INL contamination, based on historic DEQ-INL sample results. Detectable levels for manganese ranged from 2 to 8 µg/L on-site, 7 µg/L at one location off-site and 2 to 3 µg/L at the surface water sites, and were all within expected ranges. The recommended drinking water secondary maximum contaminant level (SMCL) for manganese is 50 µg/L. Lead was detected in one on-site sample (USGS-100). Detectable zinc levels ranged from 18 to 230 µg/L on-site and 48 to 160 µg/L off-site, all less than the SMCL of 5,000 µg/L.

Common ion and nutrient results are shown in **Table 17**. All common ion results fall within the expected ranges. Samples collected for nitrogen at CFA 1 and USGS-027 contained 3.25 and 2.47 mg/L, respectively. Typical background nitrogen concentrations observed by DEQ-INL are less than 2 mg/L; however, these results are below the nitrogen MCL of 10 mg/L. All other nutrient samples were within expected ranges.

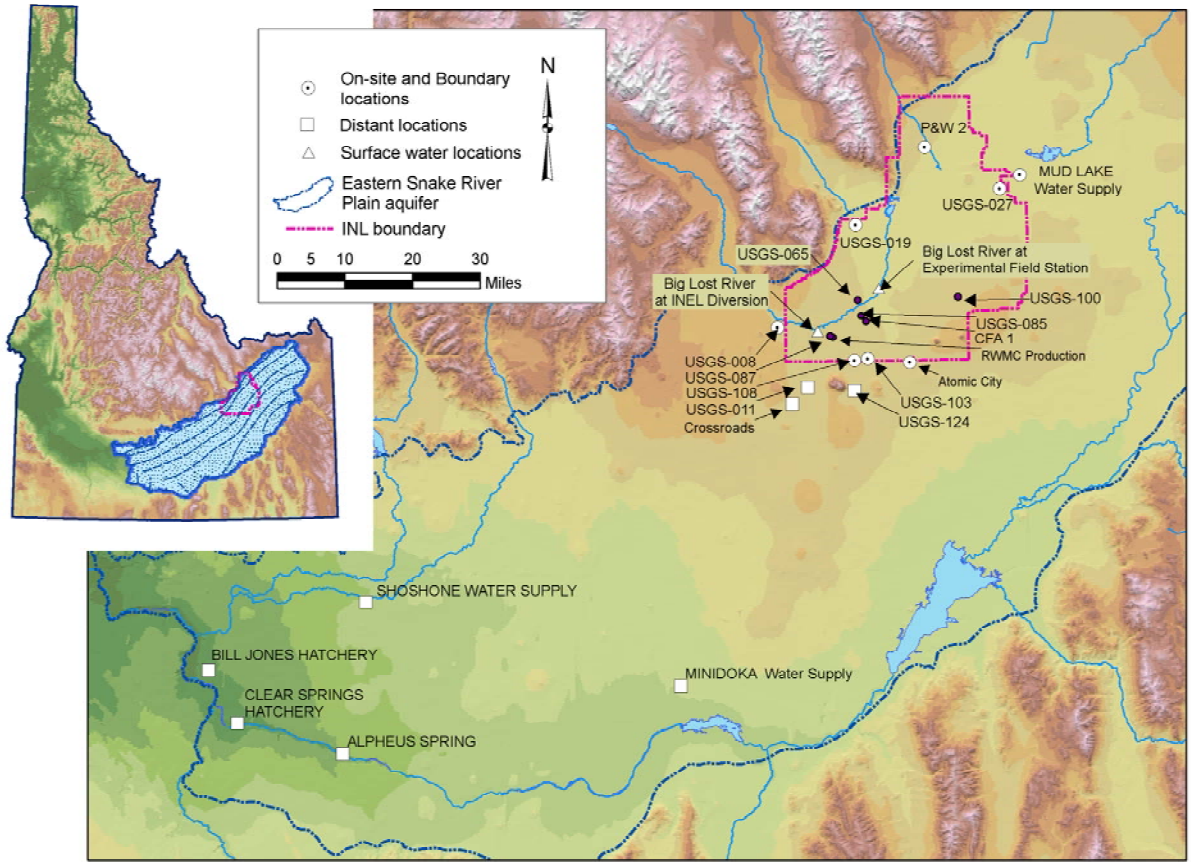

Figure 2. Water monitoring locations.

Table 11. Alpha, beta, and gamma concentrations[1] for water samples, second quarter, 2005. Concentrations are expressed in pCi/L.

Sample Location	Sample Date	Gross Alpha		Gross Beta		Man-made gamma-emitting radionuclide Cesium-137
		Concentration	± 2 SD	Concentration	± 2 SD	Concentration
On-site and Boundary						
Atomic City	4/14/2005	1.0 U	1.8	4.7	1.0	<MDC
CFA 1	4/18/2005	1.9 U	2.5	8.0	1.2	<MDC
Mud Lake Water Supply	5/17/2005	0.8 U	1.2	4.2	0.9	<MDC
P&W-2	4/13/2005	2.4 U	1.9	1.7	0.9	<MDC
RWMC Production	4/14/2005	-1.6 U	2.3	3.3	1.0	<MDC
USGS-008	4/26/2005	-1.1 U	2.2	1.2 U	1.0	<MDC
USGS-103	4/18/2005	0.1 U	2.3	3.1	1.0	<MDC
USGS-019	4/13/2005	0.6 U	1.9	1.7	0.9	<MDC
USGS-027	4/13/2005	4.5	2.7	7.6	1.2	<MDC
USGS-065	4/14/2005	1.2 U	2.4	4.9	1.1	<MDC
USGS-085	4/12/2005	2.1 U	2.3	9.7	1.2	<MDC
USGS-087	4/14/2005	1.6 U	1.9	3.7	1.0	<MDC
USGS-100	4/25/2005	-1.2 U	2.0	2.8	1.0	<MDC
USGS-108	4/26/2005	1.7 U	1.8	2.5	0.9	<MDC
Off-site and Distant						
Alpheus Spring	5/10/2005	3.6 U	2.4	6.6	1.1	<MDC
Bill Jones Hatchery	5/10/2005	1.6 U	1.6	3.5	0.9	<MDC
Clear Spring Hatchery	5/10/2005	3.4	2.1	4.8	1.0	<MDC
Crossroads	4/25/2005	1.5 U	1.7	2.5	0.9	<MDC
Minidoka Water Supply	5/10/2005	2.2 U	1.9	3.5	1.0	<MDC
Shoshone Water Supply	5/10/2005	1.0 U	2.0	2.3	0.9	<MDC
USGS-011	4/26/2005	0.8 U	2.3	2.3	1.0	<MDC
USGS-124	4/26/2005	2.2 U	1.9	3.4	1.0	<MDC
Surface Water						
BLR @ Experimental Field Station	6/2/2005	1.2 U	1.8	2.3	0.9	<MDC
BLR @ INEL Diversion	6/2/2005	1.3 U	1.7	2.1	0.9	<MDC

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected. <MDC – Less than minimum detectable concentration for analysis by gamma spectroscopy.

Table 12. Reported concentrations[1] of technetium-99 in water samples, second quarter, 2005. Concentrations are expressed in pCi/L. Samples were filtered.

Sample Location	Sample Date	Technetium-99	
		Concentration	± 2 SD
On-site and Boundary			
CFA 1	4/18/2005	9.8	0.2
RWMC Production	4/14/2005	1.1	0.2
USGS-085	4/12/2005	2.9	0.2
USGS-108	4/26/2005	0.5	0.2
Off-site and Distant			
USGS-124	4/26/2005	0.7	0.1

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 13. Reported concentrations[1] of strontium-90 in water samples, second quarter, 2005. Concentrations are expressed in pCi/L. Samples were not filtered.

Sample Location	Sample Date	Strontium-90		
		Concentration		± 2 SD
On-site and Boundary				
CFA 1	4/18/2005	-0.03	U	0.2
RWMC Production	4/14/2005	0.43	U	0.3
USGS-085	4/12/2005	3.28		0.9

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 14. Tritium concentrations[1] for water samples, second quarter, 2005. Concentrations are expressed in pCi/L. .

Sample Location	Sample Date	Tritium	
		Concentration	± 2 SD
On-site and Boundary			
Atomic City	4/14/2005	0 U	70
CFA 1	4/18/2005	7780	230
Mud Lake Water Supply	5/17/2005	-20 U	70
P&W-2	4/13/2005	10 U	70
RWMC Production	4/14/2005	1100	110
USGS-008	4/26/2005	-70 U	70
USGS-103	4/18/2005	0 U	70
USGS-019	4/13/2005	-30 U	70
USGS-027	4/13/2005	0 U	70
USGS-065	4/14/2005	6760	220
USGS-085	4/12/2005	2430	140
USGS-087	4/14/2005	820	100
USGS-100	4/25/2005	-70 U	70
USGS-108	4/26/2005	-40 U	70
Off-site and Distant			
Alpheus Spring	5/10/2005	10 U	70
Bill Jones Hatchery	5/10/2005	-10 U	80
Clear Spring Hatchery	5/10/2005	20 U	80
Crossroads	4/25/2005	-60 U	70
Minidoka Water Supply	5/10/2005	-20 U	70
Shoshone Water Supply	5/10/2005	-20 U	80
USGS-011	4/26/2005	-30 U	80
USGS-124	4/26/2005	80 U	80
Surface Water			
BLR @ Experimental Field Station	6/2/2005	50 U	70
BLR @ INEL Diversion	6/2/2005	70 U	70

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 15. Enriched tritium concentrations[1] for water samples, second quarter, 2005. Concentrations are expressed in pCi/L.

Sample Location	Sample Date	Tritium	
		Concentration	± 2 SD
On-site and Boundary			
Atomic City	4/14/2005	8 U	6
Mud Lake Water Supply	5/17/2005	2 U	6
P&W-2	4/13/2005	12	7
USGS-008	4/26/2005	19	6
USGS-103	4/18/2005	11	6
USGS-019	4/13/2005	4 U	5
USGS-027	4/13/2005	6 U	6
USGS-100	4/25/2005	15	7
USGS-108	4/26/2005	54	8
Off-site and Distant			
Alpheus Spring	5/10/2005	26	7
Bill Jones Hatchery	5/10/2005	3 U	6
Clear Spring Hatchery	5/10/2005	9 U	6
Crossroads	4/25/2005	16	8
Minidoka Water Supply	5/10/2005	13	7
Shoshone Water Supply	5/10/2005	23	7
USGS-011	4/26/2005	17	7
USGS-124	4/26/2005	109	9

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 16. Reported dissolved trace metal concentrations[1] for the water samples, second quarter, 2005. Concentrations are expressed in µg/L. Samples were filtered.

Sample Location	Sample Date	Concentration				
		Barium	Chromium	Manganese	Lead	Zinc
On-site and Boundary						
Atomic City	4/14/2005	32	<2 U	<2 U	<5 U	29
CFA 1	4/18/2005	91	10	<2 U	<5 U	<5 U
P&W-2	4/13/2005	44	<5 U	<2 U	<5 U	60
RWMC Production	4/14/2005	37	12	<2 U	<5 U	18
USGS-008	4/26/2005	72	<5 U	<2 U	<5 U	<5 U
USGS-103	4/18/2005	44	<5 U	<2 U	<5 U	220
USGS-019	4/13/2005	70	<5 U	2	<5 U	<5 U
USGS-027	4/13/2005	77	<5 U	6	<5 U	<5 U
USGS-065	4/14/2005	47	96	<2 U	<5 U	<5 U
USGS-085	4/12/2005	87	22	<2 U	<5 U	<5 U
USGS-087	4/14/2005	26	6	8	<5 U	19
USGS-100	4/25/2005	37	<5 U	<2 U	10	230
USGS-108	4/26/2005	37	6	<2 U	<5 U	200
Off-site and Distant						
Crossroads	4/25/2005	31	<5 U	<2 U	<5 U	48
USGS-011	4/26/2005	50	<5 U	<2 U	<5 U	160
USGS-124	4/26/2005	27	<5 U	7	<5 U	<5 U
Surface Water						
BLR @ INEL Diversion	6/2/2005	61	<5 U	2	<5 U	<5 U
BLR @ Experimental Field Station	6/2/2005	61	<5 U	3	<5 U	<5 U

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected. A "<" indicates a result below the Minimum Detectable Concentration.

Table 17. Reported common ions and nutrient concentrations[1] for the water samples, second quarter, 2005. Concentrations are expressed in mg/L.

Sample Location	Sample Date	Concentration									
		Calcium	Magnesium	Sodium	Potassium	Fluoride	Chloride	Sulfate	Total Alkalinity[2]	Total Nitrate + Nitrite[3]	Total Phosphorus[4]
On-site and Boundary											
Atomic City	4/14/2005	37	14	16	3.2	0.8	18.2	17	136	1.34	0.01
CFA 1	4/18/2005	70	21	32	4.1	0.33	115	32.1	126	3.25	0.02
P&W-2	4/13/2005	44	17	7.7	1.2	0.31	8.34	26.2	146	0.519	0.01
RWMC Production	4/14/2005	48	16	9	2.6	0.36	20.6	27.5	140	0.915	0.02
USGS-008	4/26/2005	46	15	6.9	1.8	0.21	8.16	21.7	155	0.928	0.01
USGS-103	4/18/2005	39	15	14	2.8	0.5	18	24.4	138	0.881	0.01
USGS-019	4/13/2005	46	17	9.9	1.4	0.2	10.2	21	159	0.837	0.01
USGS-027	4/13/2005	55	19	28	6	0.83	55.2	41.2	147	2.47	0.01
USGS-065	4/14/2005	86	18	14	4.2	0.32	19.5	161	124	1.6	0.02
USGS-085	4/12/2005	58	14	14	2.8	0.34	18.1	36.5	160	1.16	0.02
USGS-087	4/14/2005	39	15	16	3.3	0.38	32.6	27	119	0.734	0.01
USGS-100	4/25/2005	40	13	17	3.3	0.93	18	21.8	135	1.98	0.02
USGS-108	4/26/2005	37	15	11	2.7	0.43	15.7	22.6	134	0.746	0.02
Off-site and Distant											
Crossroads	4/25/2005	41	14	7.7	2.3	0.31	9.93	20.5	148	0.774	0.02
USGS-011	4/26/2005	42	14	8.2	2.3	0.24	10.5	22	141	0.682	0.02
USGS-124	4/26/2005	39	16	9.5	2.4	0.51	15.8	22.5	137	0.826	0.01
Surface Water											
BLR @ Experimental Field Station	6/2/2005	32	7.3	4.6	1.4	0.31	2.75	15.5	100	0.029	0.02
BLR @ INEL Diversion	6/2/2005	33	7.4	4.5	1.4	0.3	2.62	15.3	99	0.045	0.02

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected. A "<" indicates a result below the Minimum Detectable Concentration;
[2] As $CaCo_3$
[3] Dissolved nitrate + nitrite as N
[4] Dissolved phosphorus as P

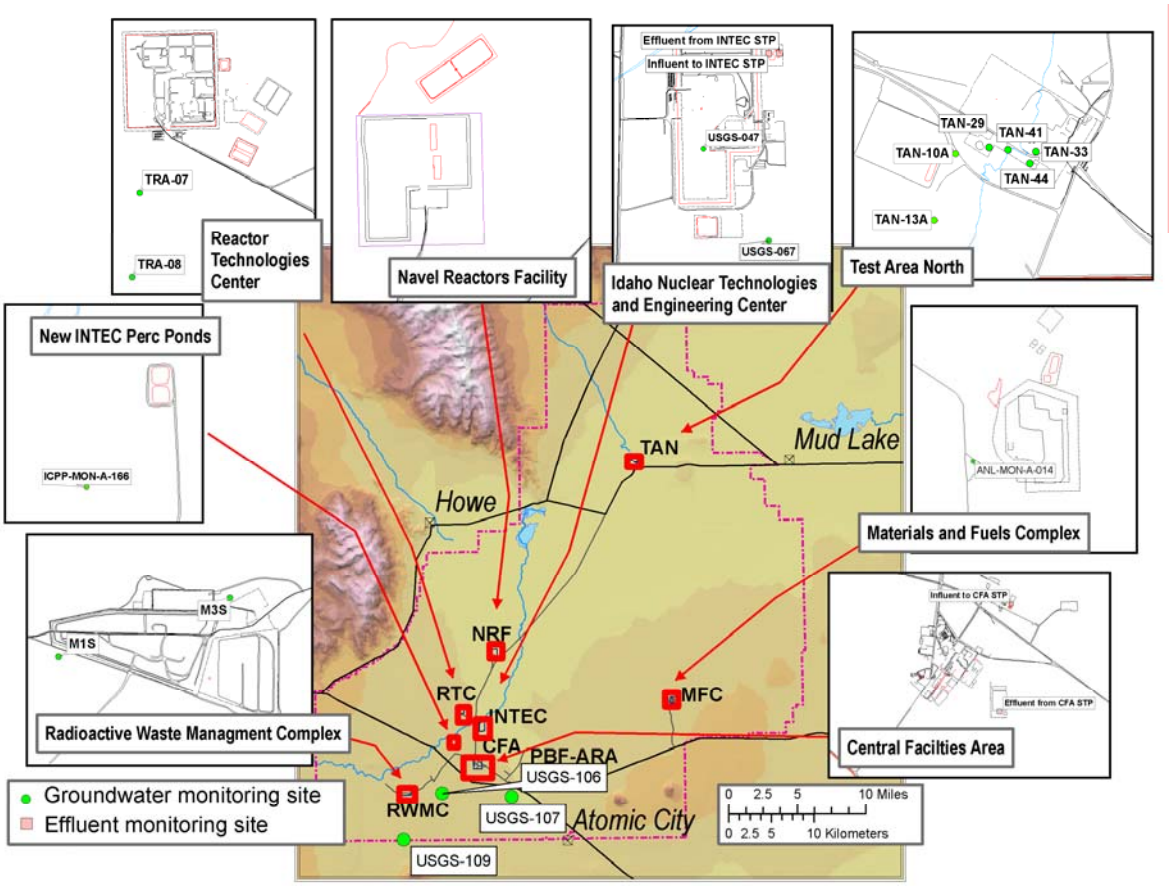

Figure 3. Planned water sampling sites for second quarter, 2005. The purpose of DOE monitoring for each site is indicated in the figure key.

Water Verification Sampling Program

Water samples were collected from selected sites to verify results attained by various DOE monitoring programs (**Figure 3**). The primary drivers for DOE monitoring conducted at each facility are divided into three basic groups: DOE monitoring conducted to support remediation activities (CERCLA), water monitoring to support wastewater land application permits (WLAP), and monitoring conducted under DOE environmental directives (surveillance). Selected sites monitored by BBWI, NRF and ANL-W are sampled each year and a comparison of results is presented in the DEQ-INL annual report. During the second quarter of 2005, the DEQ-INL sampled 2 wastewater sites and 14 groundwater sites. Two additional sites, TRA 08 and TAN 13A, were scheduled to be sampled this quarter but were out of service.

Gross alpha radioactivity was detected in two of the ten groundwater locations. Both sites are in areas of known contamination. The levels of alpha radioactivity ranged from 5.5 ± 2.8 to 12.8 ± 5.1 pCi/L, all below the alpha radioactivity MCL of 15 pCi/L. Gross beta radioactivity was measured in all samples and ranged from 1.9 ± 1 to 215.5 ± 5.6 pCi/L. Man-made, gamma-emitting radionuclides were detected this quarter in a sample from USGS-047 (5.7 ± 2.2) pCi/L, an area of known contamination near INTEC. Analytical results for gross alpha, gross beta, and gamma radioactivity are presented in **Table 18**.

Strontium-90 was detected in two of four samples and ranged from 11.9 ± 2.9 to 33.3 ± 7.9 pCi/L, which is above the 8 pCi/L MCL. Concentrations at both locations are consistent with historical trends (**Table 19**). Technetium-99 was detected at all eight locations sampled, which was expected for wells impacted by historical INL operations. The results are shown in **Table 20** and range from 0.3 ± 0.1 to 130 ± 0.7 pCi/L.

Tritium was detected in 10 of the 14 groundwater samples with detections ranging from 180 ± 80 to 5520 ± 200 pCi/L (**Table 21**). Wastewater sample results ranged from 4790 ± 190 to 6210 ± 210 pCi/L. These wastewater samples originate from groundwater which has an elevated concentration of tritium prior to entering the CFA water system. Enriched tritium samples were taken for three sites and ranged from 80 ± 9 to 825 ± 21 pCi/L (**Table22**). All concentrations were below the MCL of 20,000 pCi/L.

Transuranic elements were not detected in the second quarter samples (**Tables 23 and 24).** Uranium-234, 235 and 238 were detected in the sample from USGS-047, an area of known contamination, which is down gradient from the INTEC tank farms (**Table 25**).

Common ion results are within expected ranges and are shown in **Table 26**. Alkalinity ranged from 96 to 270 mg/L. Chloride ranged from 8.39 to 288 mg/L, the highest concentrations found in wastewater samples. Fluoride results ranged from 0.23 to 0.87 mg/L, the highest concentrations found in wastewater samples. Silica results ranged from 17.3 to 34.2 mg/L. Sulfate ranged from 17.7 to 49.1 mg/L. TDS ranged from 190 to 843, the highest concentrations are found in wastewater samples. Detectable TSS ranged from 10 to 37 mg/L.

All measured nutrient concentrations at each monitoring site were within observed trends for the sampled sites **(Table 27)**. Detectable results for nitrate + nitrite as nitrogen ranged from 0.025 to 5.54 mg/L. Results for USGS-047 and USGS-067 are impacted by historic contamination from INTEC. Total phosphorous ranged from 0.013 to 2.16 mg/L, the highest concentrations found in wastewater samples. Detectable TKN results ranged from 0.051 to 15.7 mg/L, the highest concentrations found in wastewater samples. There was one detectable result for ammonia 0.006 mg/L (TAN-10A).

Results for metal analysis are shown in **Table 28**. All metals results were consistent with historical trends. Data qualified as estimates or rejected in Tables 26, 27, and 28 are discussed in greater detail in the Quality Assurance section of this report.

The analytical results for detectable VOCs are shown in **Table 29**. Samples were also collected at M1S, USGS-047, USGS-106, USGS 107, and USGS 109, but did not contain detectable levels of VOCs. All results were consistent with historical trends. MDC's for all samples monitored for VOCs during the second quarter of 2005 are listed in **Appendix D**.

Table 18. Reported concentrations[1] of gross alpha, gross beta, and cesium-137 in water samples, second quarter, 2005. Concentrations are expressed in pCi/L. Samples were not filtered.

Sample Location	Sample Date	Gross Alpha		Gross Beta		Man-made, gamma-emitting radionuclide Cesium-137	
		Concentration	± 2 SD	Concentration	± 2 SD	Concentration	± 2 SD
Wastewater							
Influent to CFA STP	6/28/2005	2.4 U	4.3	6.4	2.3	-0.2 U	2.0
Effluent from CFA STP	6/28/2005	-3.2 U	5.1	7.7	2.5	-0.3 U	1.4
Groundwater							
ANL-MON-A-014	5/24/2005	-0.5 U	1.8	3.4	1.0	-0.5 U	1.5
ICPP-MON-A-166	4/14/2005	1.6 U	2.2	2.6	1.0	-0.5 U	1.6
M1S	4/28/2005	-0.3 U	1.7	2.0	0.9	0.8 U	2.1
M3S	4/28/2005	0.8 U	2.2	1.9	1.0	-0.4 U	1.7
TAN-10A	4/11/2005	12.8	5.1	215.5	5.6	1.0 U	1.4
USGS-047	4/4/2005	2.7 U	2.1	83.3	2.3	5.7	2.2
USGS-067	4/12/2005	5.5	2.8	96.1	2.5	0.5 U	1.5
USGS-106	6/7/2005	1.8 U	1.9	2.6	1.0	-0.5 U	1.5
USGS-107	6/29/2005	-0.2 U	2.0	2.1	0.9	0.8 U	1.8
USGS-109	6/29/2005	0.8 U	2.1	2.9	1.0	0.2 U	1.4

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 19. Reported concentrations[1] of strontium-90 in water samples, second quarter, 2005. Concentrations are expressed in pCi/L. Samples were not filtered.

Sample Location	Sample Date	Strontium-90	
		Concentration	± 2 SD
Groundwater			
M1S	4/28/2005	0.02 U	0.19
M3S	4/28/2005	0.29 U	0.26
USGS-047	4/4/2005	33.3	7.9
USGS-067	4/12/2005	11.9	2.9

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 20. Reported concentrations[1] of dissolved technetium-99 in water samples, second quarter, 2005. Concentrations are expressed in pCi/L. Samples were filtered.

Sample Location	Sample Date	Technetium-99	
		Concentration	± 2 SD
Groundwater			
ANL-MON-A-014	5/24/2005	0.3	0.1
M1S	4/28/2005	0.5	0.1
M3S	4/28/2005	1.0	0.1
USGS-047	4/4/2005	20.9	0.3
USGS-067	4/12/2005	129.6	0.7
USGS-106	6/7/2005	0.9	0.1
USGS-107	6/29/2005	0.3	0.1
USGS-109	6/29/2005	0.3	0.1

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 21. Reported concentrations[1] of tritium in water samples, second quarter, 2005. Concentrations are expressed in pCi/L.

Sample Location	Sample Date	Tritium		
		Concentration		± 2 SD
Wastewater				
Effluent from CFA STP	6/28/2005	4790		190
Influent to CFA STP	6/28/2005	6210		210
Groundwater				
ANL-MON-A-014	5/24/2005	10	U	70
ICPP-MON-A-166	4/14/2005	180		80
M1S	4/28/2005	-80	U	70
M3S	4/28/2005	1120		110
TAN-10A	4/11/2005	190		80
TAN-29	4/12/2005	2930		160
TAN-33	4/13/2005	1400		120
TAN-41	4/13/2005	1820		130
TAN-44	4/13/2005	1890		130
USGS-047	4/4/2005	2790		150
USGS-067	4/12/2005	5520		200
USGS-106	6/7/2005	830		100
USGS-107	6/29/2005	10	U	70
USGS-109	6/29/2005	100	U	70

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 22. Reported concentrations[1] for tritium by enrichment for water samples, second quarter, 2005. Concentrations are expressed in pCi/L.

Sample Location	Sample Date	Tritium	
		Concentration	± 2 SD
Groundwater			
USGS-106	6/7/2005	825	21
USGS-107	6/29/2005	5 U	5
USGS-109	6/29/2005	80	9

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 23. Reported concentrations[1] of americium-241 in water samples, second quarter, 2005. Concentrations are expressed in pCi/L. Samples were not filtered.

Sample Location	Sample Date	Americium-241	
		Concentration	±2 SD
Groundwater			
M1S	4/28/2005	0.02 U	0.035
M3S	4/28/2005	-0 U	0.032
USGS-047	4/4/2005	0 U	0.034
USGS-067	4/12/2005	0 U	0.028

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 24. Reported concentrations[1] of total plutonium-238, plutonium-239/240, and plutonium-241 in water samples, second quarter, 2005. Concentrations are expressed in pCi/L. Samples were not filtered.

Sample Location	Sample Date	Plutonium-238		Plutonium-239/240		Plutonium-241	
		Concentration	± 2 SD	Concentration	± 2 SD	Concentration	± 2 SD
Groundwater							
USGS-047	4/4/2005	0.01 U	0.023	-0.004 U	0.023	4.3 U	5.4
USGS-067	4/12/2005	-0 U	0.025	0 U	0.025	5 U	5.9
M1S	4/28/2005	-0 U	0.025	0.003 U	0.025	3.6 U	5.7
M3S	4/28/2005	-0 U	0.024	-0.002 U	0.024	4.8 U	5.7

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected; NR = analysis not requested.

Table 25. Reported concentrations[1] of total uranium-234, uranium-235, and uranium-238 in water samples, second quarter, 2005. Concentrations are expressed in pCi/L. Samples were not filtered.

Sample Location	Sample Date	Uranium-234		Uranium 235		Uranium-238	
		Concentration	± 2 SD	Concentration	± 2 SD	Concentration	± 2 SD
Groundwater							
USGS-047	4/4/2005	1.85	0.41	0.17	0.1	0.95	0.3

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table 26. Reported concentrations[1] for common ions for the water samples, second quarter, 2005. Concentrations are expressed in mg/L. Samples were not filtered.

Sample Location	Sample Date	Concentration						
		Total Alkalinity	Chloride	Fluoride	Silica	Sulfate	TDS[2]	TSS[3]
Wastewater								
Effluent from CFA STP	6/28/2005	195	288.0	0.67	17.3	49.1	843	<1 U
Influent to CFA STP	6/28/2005	189	143.0	0.32	28.1	47.0	564	22.4
Groundwater								
ANL-MON-A-014	5/24/2005	138	19.1	0.87	33.6	16.9	220	<1 U
ICPP-MON-A-166	4/14/2005	135	8.39	0.3	25.0	17.7	190	10
M1S	4/28/2005	96	14.5	0.39	34.2	21.0	190	<1 U
M3S	4/28/2005	142	14.0	0.23	26.4	25.5	240	<1 U
TAN-10A	4/11/2005	270	105.0	0.25	18.9	40.2	500	<2 U
USGS-047	4/4/2005	157	25.5	0.30	20.6	26.5	280	<1 U
USGS-067	4/12/2005	124	92.5	0.27	23.0	27.9	390	37.0
USGS-106	6/7/2005	157 J	15.6 J	0.22 J	26.0 J	24.1 J	236 J	<1 R
USGS-107	6/29/2005	143	22.4	0.57	31.0	26.6	294	<1 U
USGS-109	6/29/2005	141	14.0	0.36	25.1	26.1	360	<1 U

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected. A "<" indicates a result below the Minimum Detectable Concentration.
[2] Total dissolved solids.
[3] Total suspended solids.

Table 27. Reported total nutrient concentrations[1] in water samples, second quarter, 2005. Concentrations are expressed in mg/L. Samples were not filtered.

Sample Location	Sample Date	Concentration								
		Ammonia (as Nitrogen)		Total Kjeldahl Nitrogen		Nitrite (as Nitrogen)		Nitrite + Nitrate (as Nitrogen)		Phosphorus
Wastewater										
Effluent from CFA STP	6/28/2005	NR		1.73		NR		0.025		1.18
Influent to CFA STP	6/28/2005	NR		15.7		NR		0.63		2.16
Groundwater										
ANL-MON-A-014	5/24/2005	NR		NR		NR		1.94		0.012
ICPP-MON-A-166	4/14/2005	NR		0.051		0.012	R	0.219		0.055
M1S	4/28/2005	NR		NR		NR		1.07	J	0.018
M3S	4/28/2005	NR		NR		NR		0.836		0.019
TAN-10A	4/11/2005	0.006		0.079		<0.005	U	<0.005	U	0.084
USGS-047	4/4/2005	NR		NR		NR		5.54		0.036
USGS-067	4/12/2005	NR		NR		NR		3.64		0.074
USGS-106	6/7/2005	NR		NR		NR		1.03	J	0.019
USGS-107	6/29/2005	NR		NR		NR		1.16		0.015
USGS-109	6/29/2005	NR		NR		NR		0.63		0.013

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected. A "<" indicates a result below the Minimum Detectable Concentration; NR = analysis not requested.

Table 28. Reported metals concentrations[1] in water samples, first quarter, 2005. Samples are identified as total (unfiltered) or dissolved (filtered).

Sample Location	Sample Date	Concentration											
		Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Iron (µg/L)
Wastewater													
Effluent to CFA STP	6/28/2005	0.3	0.2	3.9	0.4	<5 U	<2 U	<1 U	<1 U	<5 U	<10 U	<10 U	<10 U
Groundwater													
ANL-MON-A-014 (total)	5/24/2005	41	13	18	3.3	<5 U	40	<1 U	<1 U	<5 U	<10 U	<10 U	120
ICPP-MON-A-166 (total)	4/14/2005	38	13	9.6	2.7	<5 U	57	<1 U	<1 U	14	<10 U	<10 U	595
M1S (dissolved)	4/28/2005	28	11.7	11	2.7	<5 U	21	<1 U	<1 U	36	<10 U	<10 U	<10 U
M1S (total)	4/28/2005	28	11.4	11	2.7	<5 U	21	<1 U	<1 U	37	<10 U	<10 U	40
M3S (dissolved)	4/28/2005	46	14	8.1	2.7	<5 U	43	<1 U	<1 U	15	<10 U	<10 U	<10 U
M3S (total)	4/28/2005	46	14	8	2.7	<5 U	43	<1 U	<1 U	16	<10 U	<10 U	10
TAN-10A (total)	4/11/2005	99	25	53	4.2	<5 U	272	<1 U	<1 U	<5 U	<10 U	<10 U	880
USGS-047 (total)	4/4/2005	60	16	14	2.3	<5 U	76	<1 U	<1 U	7	<10 U	<10 U	10
USGS-067 (total)	4/12/2005	64	17	37	4.4	<5 U	152	<1 U	<1 U	12	<10 U	<10 U	1030
USGS-106 (dissolved)	6/7/2005	49 J	17 J	8.4 J	2.4 J	<5 R	53 J	<1 R	<1 R	8 J	<10 R	<10 R	10 J
USGS-107 (dissolved)	6/29/2005	40	17	19	3.6	<5 U	61	<1 U	<1 U	<5 U	<10 U	<10 U	<10 U
USGS-109 (dissolved)	6/29/2005	41	16	13	2.9	<5 U	31	<1 U	<1 U	6	<10 U	<10 U	20

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected. A "<" indicates a result below the Minimum Detectable Concentration; NR = analysis not requested.

Table 28 continued. Reported metals concentrations[1] in water monitoring samples, second quarter, 2005. Samples are identified as total (unfiltered) or dissolved (filtered). .

Sample Location	Sample Date 2005	Concentration										
		Lead (µg/L)	Manganese (µg/L)	Thallium (µg/L)	Nickel (µg/L)	Silver (µg/L)	Vanadium (µg/L)	Zinc (µg/L)	Antimony (µg/L)	Aluminum (µg/L)	Selenium (µg/L)	Mercury (µg/L)
Wastewater												
Effluent from CFA STP (dissolved)	6/28/2005	<5 U	<2 U	NR	NR	NR	NR	<5 U	NR	NR	<10 U	NR
Groundwater												
ANL-MON-A-014 (total)	5/24/2005	<5 U	<2 U	<1 U	<10 U	<1 U	<100 U	<5 U	<5 U	<100 U	<10 U	<0.5 U
ICPP-MON-A-166 (total)	4/14/2005	<5 U	29	<1 U	<10 U	<1 U	NR	8	<5 U	900	<10 U	<0.5 U
M1S (total)	4/28/2005	<5 U	<2 U	<1 U	<10 U	<1 U	<100 U	5	<5 U	<100 U	<10 U	<0.5 U
M1S (dissolved)	4/28/2005	<5 U	<2 U	<1 U	<10 U	<1 U	<100 U	<5 U	<5 U	<100 U	<10 U	<0.5 U
M3S (total)	4/28/2005	<5 U	<2 U	<1 U	<10 U	<1 U	<100 U	<5 U	<5 U	<100 U	<10 U	<0.5 U
M3S (dissolved)	4/28/2005	<5 U	<2 U	<1 U	<10 U	<1 U	<100 U	<5 U	<5 U	<100 U	<10 U	<0.5 U
TAN-10A (total)	4/11/2005	<5 U	485	<1 U	<10 U	<1 U	NR	10	<5 U	<100 U	<10 U	<0.5 U
USGS-047 (total)	4/4/2005	<5 U	<2 U	<1 U	<10 U	<1 U	NR	259	<5 U	<100 U	<10 U	<0.5 U
USGS-067 (total)	4/12/2005	<5 U	17	<1 U	<10 U	<1 U	NR	18	<5 U	600	<10 U	<0.5 U
USGS-106 (dissolved)	6/7/2005	15 J	<2 R	<1 R	<10 R	<1 R	NR	180 J	<5 R	<100 R	<10 R	<0.5 R
USGS-107 (dissolved)	6/29/2005	<5 U	<2 U	<1 U	<10 U	<1 U	NR	<5 U	<5 U	<100 U	<10 U	<0.5 U
USGS-109 (dissolved)	6/29/2005	<5 U	4	<1 U	<10 U	<1 U	NR	150	<5 U	<100 U	<10 U	<0.5 U

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected. A "<" indicates a result below the Minimum Detectable Concentration; "- -" = analysis not requested.

Table 29. Volatile organic compound (VOC) concentrations[1] for water samples, second quarter, 2005. Concentrations are expressed in µg/L.

Sample Site/Analyte	Result	IDL
M3S		
Carbon Tetrachloride	4.2	0.39
Trichloroethylene	0.95	0.07
TAN-29		
1,1-Dichloroethene	1.21	0.49
Cis-1,2-Dichloroethene	117.5	0.1
Trans-1,2-Dichloroethene	89.5	0.13
Tetrachloroethylene	14.5	0.04
Trichloroethylene	963	0.07
Vinyl Chloride	2.77	0.25
Chloroform	0.36	0.25
1,1-Dichloroethane	0.5	0.5
TAN-33		
1,1-Dichloroethene	0.71	0.49
Cis-1,2-Dichloroethene	1.25	0.1
Trans-1,2-Dichloroethene	0.6	0.13
Tetrachloroethylene	0.9	0.04
1,1,1-Trichloroethane	0.53	0.23
Trichloroethylene	53	0.07
Chloroform	0.38	0.25
TAN-41		
1,1-Dichloroethene	0.56	0.49
Cis-1,2-Dichloroethene	9.34	0.1
Trans-1,2-Dichloroethene	10.6	0.13
Tetrachloroethylene	24	0.04
1,1,1-Trichloroethane	0.42	0.23
Trichloroethylene	172	0.07
Chloroform	0.39	0.25
1,1-Dichloroethane	0.78	0.5
TAN-44		
Cis-1,2-Dichloroethene	1.81	0.1
Trans-1,2-Dichloroethene	0.82	0.13
Tetrachloroethylene	5.2	0.04
Trichloroethylene	51	0.07
USGS-067		
Toluene	0.33	0.11

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected. MDC – Minimum Detectable Concentration.

Terrestrial Monitoring Results

The ESP conducts terrestrial (soil and milk) monitoring and verification to provide an indication as to the long-term deposition and migration of contaminants in the environment, and to provide independent verification of DOE's analytical measurement of terrestrial variables.

Results for analyses of milk samples, which are collected monthly, are presented in **Table 30**. Naturally occurring potassium-40 was detected in all samples within the expected range. Iodine-131, a man-made radionuclide, was not detected.

DEQ-INL monitors long-term radiological conditions using measurement devices capable of identifying and measuring quantities of gamma-emitting radionuclides in soil. Monitoring concentrations of gamma-emitting radionuclides in surface soil provides insight to the transport, deposition, and accumulation of radioactive material in the environment as a result of INL operations and the historic atmospheric testing of nuclear weapons.

No soil samples were collected during the second quarter of 2005.

Table 30. Gamma spectroscopy analysis data for milk samples, second quarter, 2005. Concentrations are expressed in pCi/L.

Sample Location/Dairy	Sample Date	Naturally occurring gamma-emitting radionuclide Potassium-40 (pCi/L)		Man-made gamma-emitting radionuclide Iodine-131[1]
		Concentration	± 2 SD	
Monitoring Samples				
Howe/Nelson-Ricks Creamery	4/12/05	1359	114	<MDC
	5/10/05	1275	109	<MDC
	6/07/05	1391	116	<MDC
Mud Lake/Nelson-Ricks Creamery	4/12/05	1397	110	<MDC
	5/10/05	1671	115	<MDC
	6/07/05	1668	115	<MDC
Rupert-Minidoka/Kraft	4/12/05	1437	118	<MDC
	5/10/05	1471	119	<MDC
	6/07/05	1534	121	<MDC
Gooding/Glanbia	4/12/05	1430	112	<MDC
	5/11/05	1465	113	<MDC
	6/07/05	1405	111	<MDC
Verification Samples[2]				
Dietrich	04/05/05	1394	110	<MDC
Idaho Falls	04/05/05	1500	120	<MDC
Moreland	05/03/05	1584	111	<MDC
Moreland	06/07/05	1509	108	<MDC
Roberts	05/03/05	1383	115	<MDC
Roberts	06/07/05	1316	107	<MDC

[1] <MDC – Less than Minimum Detectable Concentration (approximately 4 pCi/L for Iodine-131).
[2] DEQ-INL samples collected by the off-site INL environmental surveillance contractor.

Quality Assurance

The measurement of any physical quantity is subject to uncertainty from errors that may be introduced during sample collection, measurement, calibration, and the reading and reporting of results. While the sum of these inaccuracies cannot be quantified for each analytical result, a quality assurance program can evaluate the overall quality of a data set and possibly identify and address errors or inaccuracies.

This section summarizes the results of the quality assurance (QA) assessment of the data collected for the second quarter of 2005 for the DEQ-INL's ESP. It also summarizes the quality control (QC) samples (spikes, blanks, and duplicates) submitted to the Idaho Bureau of Laboratories-Boise (IBL) for nonradiological analyses and to Idaho State University's Environmental Monitoring Laboratory (ISU-EML) for radiological analyses during the quarter. All analyses and QC measures at the analytical laboratories used by the ESP are performed in accordance with approved written procedures maintained by each respective analytical laboratory. Sample collection is performed in accordance with written procedures maintained by the DEQ-INL.

Analytical results for blanks, duplicates, and spikes are used to assess the precision, accuracy, and representativeness of results from analyzing laboratories. During the second quarter of 2005, the DEQ-INL submitted 101 QC samples for various radiological and nonradiological analyses (**Table 31**).

Blank Samples

Blank samples consist of matrices that have negligible, acceptably low, or unmeasurable amounts of the analyte(s) of interest in them. They are designed to determine if analyses will provide a "zero" result when no contaminant is expected to be present or an acceptable measure of "background," and therefore monitor any bias that may have been introduced during sample collection, storage, shipment, and analysis. Blank sample results submitted for gross alpha and gross beta screening in air for the second quarter of 2005 are presented in **Table 32**. Blank sample results for select gamma emitters in air from composited air filters are presented in **Table 33**. Data for blank analyses used to assess data quality for tritium in water vapor in air are presented in **Table 34**. Blank sample results for metals in groundwater can be found in **Table 35**. Blank analyses results for cesium-137, potassium-40, tritium, enriched tritium, gross alpha, and gross beta in ground and surface water media are presented in **Table 36.** Nutrient and common ion blank results in groundwater are listed in **Table 37.**

One blank sample set used to assess contamination issues related to groundwater/surface water sampling on June 29, 2005, failed the criteria used for blank analyses. Upon investigation, it appears that a commercially purchased water source was used for the blank analysis for samples 05VG108, 109, and 110. Additionally, trace amounts of common ions were found in a blank sample submitted on April 14, 2005, (samples 052W115 & 117) indicating a contamination problem. After review of both events, it appears that a problem existed in the source water used for de-ionized water at DEQ-INL, therefore, no data were qualified. These anomalies are under investigation and DEQ-INL will formulate corrective actions when a definitive cause is found.

One tritium blank used to assess field and laboratory conditions was found to contain tritium at the laboratory detection level. No additional action was taken to qualify the data set since all other data (both QC and field data) were in control.

No additional anomalies were observed from the assessment of field blank samples as measured by the analytical laboratories used by DEQ-INL for the second quarter of 2005.

Duplicate Samples

Duplicate samples are collected in a manner such that the samples are thought to be essentially identical in composition and are used to assess analytical precision. The difference between the original sample and the duplicate sample is expressed as a relative percent difference (RPD) and is used to measure a laboratory's ability to reproduce consistent results. For radiological analyses, the standard deviation of the differences can be used as an indicator of the overall precision of the data set. Duplicate results for ground and surface water are presented in **Table 38** for radiological analyses and **Tables 39 and 40** for non-radiological analyses. Duplicate *in-situ* radiological measurement results are presented in **Table 41**.

One analyte, a duplicate measurement of fluoride, failed the relative percent difference criteria used to assess analytical performance at 33 percent. No additional action was taken to qualify the data set since all other data was in control. This parameter will be closely followed for future deviations.

No additional anomalies were observed from the assessment of field duplicate samples as measured by the analytical laboratories used by DEQ-INL for the second quarter of 2005.

Spiked Samples

Spiked samples are samples to which known concentrations of specific analytes have been added in order to assess the bias a laboratory may have in accurately measuring these analytes. To determine agreement after laboratory analysis, DEQ-INL calculates the difference between the known concentration in the sample and the measured concentration by the laboratory. This result is known as percent recovery (%R) and the acceptable range used by DEQ-INL is 100 ± 25 percent. During second quarter 2005, no field matrices were spiked to assess the influence of the sample media on laboratory performance. However, several spiked samples were created using de-ionized water and submitted to analytical laboratories for analyses. These non-radiological constituents used to assess groundwater analyte recovery rates are presented in **Tables 42, 43 & 39.** Volatile organic analyses results performed by the analytical laboratory failed the recovery criteria. However, since all field results were <IDL, no further action was taken to qualify the data. Follow-up laboratory assessment is scheduled to occur during the third quarter of 2005 with a new set of spiked samples set to the original laboratory as well as a second commercial laboratory for confirmation.

DEQ-INL also prepares additional "spike-like" quality control samples to assess ambient radiation measurement bias. Once per quarter, DEQ-INL irradiates a number of electret ionization chambers (EIC) to verify EIC response. Irradiations of EICs are conducted in a repeatable geometry to a known exposure of 30 mR and a "blind" exposure ranging from 20 to 50 mR. EIC responses are compared directly with the exposure received from the NIST traceable cesium-137 source provided by ISU-EML. EIC response is considered acceptable if each measurement agrees within 25 percent of the known irradiated quantity. The irradiation results for second quarter 2005 are presented in **Table 45.**

No additional anomalies from those outlined above were observed from the assessment of spiked samples as measured by DEQ-INL or the analytical laboratories used by DEQ-INL for the second quarter of 2005.

Analytical QA/QC Assessment

No issues involving sample chain of custody, sample holding times, the analysis of blank, duplicate, and spike samples were observed during the second quarter of 2005 which significantly affected data quality. However, several problems were identified by the analytical laboratories that required additional data qualification. The results of two nitrite analysis from groundwater monitoring wells were qualified by the analytical laboratory because of the failure of matrix spike performance criteria. One result from well M1S was qualified as an estimate, while the other from ICPP-MON-A-166 was rejected. Additionally, the results for common ion, nutrients, and metals analyses were qualified by DEQ-INL because the samples shipped on June 7, 2005, were not adequately preserved at 4 degrees C as noted by the analytical laboratory. The nutrient, common ions, and metals results were qualified as estimates or rejected altogether depending upon the measured value. Those results that exceeded the MDC were qualified as estimates and those which were below the MDC were rejected. Methodologies and data reports issued by the contracting laboratories generally conformed to the requirements of DEQ-INL during the second quarter of 2005.

ISU-EML rejected the analytical results recorded for two milk samples because of an internal loss of sample control and missed holding times. Corrective actions were initiated and completed by the laboratory.

Data usability is the measure of data that is not rejected compared to the amount that was expected to be obtained. The overall data usability rate for the second quarter of 2005 met the minimum criteria of the DEQ-INL ESP and is summarized is **Table 31.**

Preventative Maintenance and Equipment Reliability

All equipment was calibrated and checked according to pre-described periodicity. Service reliability for air sampling equipment for the second quarter of 2005 is summarized in **Table 46**. Air sampling equipment requiring repair included:

- Total Suspended Particulate (TSP) air sample blower motor at the Atomic City monitoring station was failing. Blower motor was replaced.
- Low volume air sampler rotometer at the Van Buren monitoring station failed during the second quarter of 2005. Rotometer was replaced the first week of the third quarter of 2005.

Conclusion

All data collected for the second quarter of 2005 have been assigned the applicable qualifiers to designate the appropriate use of the data. In addition, all data has been verified and deemed complete with the exception of three samples outstanding, meeting the requirements and data quality objectives established by DEQ-INL.

Table 31. Summary of the analytical performance and usability of the analyses performed for the DEQ-INL ESP for second quarter, 2005.

Media Sampled	Collection Device	Analyte	Test Analyses	Blank Analyses	Duplicate Analyses	Spike Analyses	Data Rejected[1]	Analyzing Lab[2]
AIR								
Particulate (Does not include PM_{10} measurements)	4 inch filter	Gross alpha	143	13	0	0	0	ISU-EML
		Gross beta	143	13	0	0	0	ISU-EML
		Gamma emitters	11	1	0	0	0	ISU-EML
		Radiochemical	0	0	0	0	0	ISU Sub
Particulate	Desiccant column	Tritium	44	3	0	0	0	ISU-EML
Gaseous	Charcoal filter	Iodine-131	13	0	0	0	0	ISU-EML
Precipitation	Poly bottle	Tritium	45	10	0	0	0	ISU-EML
		Gamma emitters	12	0	0	0	0	ISU-EML
WATER								
Groundwater & Surface Water	Grab or composite	Gross alpha	36	3	3	0	0	ISU-EML
		Gross beta	36	3	3	0	0	ISU-EML
		Gamma emitters	36	3	3	0	0	ISU-EML
		Tritium	40	3	3	0	0	ISU-EML
		Enriched tritium[3]	20	1	2	0	0	ISU-EML
		Technetium-99	13	0	0	0	0	ISU-EML
		Radiochemical	11	0	0	0	0	ISU Sub
		Metals	31	3	2	1	1	IBL
		Common Ions	30	3	2	1	1	IBL
		Nutrients	30	3	2	1	1	IBL
		Volatile Organics	11	0	0	1	0	IBL Sub
TERRESTRIAL								
Milk	Grab or composite	Gamma emitters	18	0	0	0	2	ISU-EML
Soil	*in situ*	Gamma emitters	54	0	2	0	0	DEQ-INL
	Grab – "puck"	Gamma emitters	0	0	0	0	0	ISU-EML
RADIATION								
Ambient	EICs	Gamma Radiation	93	4	0	8	0	DEQ-INL
	HPICs	Gamma Radiation	NA	NA	NA	NA	NA	DEQ-INL
Total Analyses			870	66	22	12	5	
Total of QC Analyses (blanks, duplicates, and spikes)						100		
Percentage of QC analyses of total analyses[4]						11.5		
Percentage of usable data[5]						99.77		

[1] Combined Laboratory and DEQ-INL rejection criteria (data was rejected for any reason).
[2] ISU-EML = Idaho State University – Environmental Monitoring Laboratory; ISU Sub = Subcontract laboratory to ISU-EML; IBL = Idaho Bureau of Laboratories, Boise; IBL Sub = Subcontract laboratory to IBL; DEQ-INL = Analyzed by INEEL Oversight and Radiation Control, Idaho Department of Environmental Quality.
[3] Three enriched tritium analyses (including one blank) were delayed and will be reported with 3rd quarter results.
[4] Analyzing quality control samples at a rate of approximately 5 to 10 percent of the total number of analyses performed for the year is deemed appropriate for the DEQ-INL ESP.
[5] Data usability rate [total analyses – rejected data]/[total analyses] of 90 percent or higher is acceptable for the DEQ-INL ESP.

Table 32. Blank analysis results for gross alpha and beta in particulate air (TSP) for the second quarter, 2005. Concentrations[1] and associated uncertainties (2 SD) are expressed in 1 x 10^{-3} pCi/m^3.

Collection Period		Corrected volume (m^3) [1]	Gross alpha		Gross beta	
Start	Stop		Value	Uncertainty (± 2 SD)	Value	Uncertainty (± 2 SD)
03/31/05	04/07/05	1731	0.0	0.2	0.1	0.3
04/07/05	04/14/05	1731	0.0	0.2	0.3	0.3
04/14/05	04/21/05	1731	-0.2	0.2	-0.3	0.3
04/21/05	04/28/05	1731	-0.1	0.2	0.0	0.3
04/28/05	05/05/05	1731	0.0	0.2	0.2	0.3
05/05/05	05/12/05	1731	-0.1	0.2	-0.1	0.3
05/12/05	05/19/05	1731	-0.1	0.2	-0.2	0.3
05/19/05	05/26/05	1731	-0.1	0.2	-0.4	0.3
05/26/05	06/02/05	1731	-0.2	0.2	0.1	0.3
06/02/05	06/09/05	1731	-0.1	0.2	0.1	0.3
06/09/05	06/16/05	1731	-0.3	0.2	-0.3	0.3
06/16/05	06/23/05	1731	-0.1	0.2	0.0	0.3
06/23/05	06/30/05	1731	0.1	0.2	-0.1	0.4

[1] A volume equal to the average of the volumes collected through each valid field filter was used to compute "concentrations" for the blank for meaningful comparison to sample results. No air was passed through the blank filters.

Table 33. Blank analysis results for gamma spectroscopy for TSP particulate air filters for the second quarter, 2005. Concentrations[1] are expressed in 1 x 10^{-5} pCi/m^3 with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).

Analysis Date	Beryllium-7			Ruthenium-106/ Rhodium-106			Antimony-125		
	Concentration	± 2 SD	MDC	Concentration	± 2 SD	MDC	Concentration	± 2 SD	MDC
07/17/05	13	23	39	4	27	46	4	6	11

[1] These concentrations are from blank filters collected weekly, composited, and analyzed for the calendar quarter. A volume equal to the average of the volumes collected through each valid field filter was used to compute "concentrations" for the blank for meaningful comparison to sample results. No air was passed through the blank filters. NR = analysis not requested.

Table 33 continued. Blank analysis results for gamma spectroscopy for TSP particulate air filters for the second quarter, 2005. Concentrations[1] are expressed in 1x10^{-5} pCi/m^3 with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).

Analysis Date	Cesium-134			Cesium-137		
	Concentration	± 2 SD	MDC	Concentration	± 2 SD	MDC
07/17/05	0	3	5	2	3	6

[1] These concentrations are from blank filters collected weekly, composited, and analyzed for the calendar quarter. A volume equal to the average of the volumes collected through each valid field filter was used to compute "concentrations" for the blank for meaningful comparison to sample results. No air was passed through the blank filters. NR = analysis not requested.

Table 34. Blank analysis results for tritium water vapor from air samples for the second quarter, 2005. Concentrations are expressed in pCi/L with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).

Sample Number	Start Date	Collect Date	Analysis Date	Tritium		
				Concentration	± 2 SD	MDC
OP052ZTR01	05/20/05	05/20/05	06/17/05	-0.04	0.07	0.12
OP052ZTR02	05/20/05	05/20/05	06/17/05	0.01	0.07	0.12
OP052ZTR03	07/11/05	07/11/05	07/29/05	0.01	0.07	0.12
OP052ZTR04	07/11/05	07/11/05	07/29/05	-0.05	0.07	0.12
OP052ZTR05	07/18/05	07/18/05	07/29/05	0.13	0.07	0.12
OP052ZTR06	07/18/05	07/18/05	07/29/05	0.00	0.07	0.12
OP052ZTR07	07/25/05	07/25/05	07/29/05	-0.03	0.07	0.12
OP052ZTR08	07/25/05	07/25/05	07/29/05	0.02	0.07	0.12
OP052ZTR09	05/06/05	07/25/05	07/29/05	0.02	0.07	0.12

Table 35. Blank analysis results (in mg/L) for metals in ground and surface water for the second quarter, 2005.

Sample Number	Sample Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
052W116	04/14/05	NR	NR	NR	<0.002	NR	NR	<0.005	NR	NR
052W121	06/02/05	NR	NR	NR	<0.002	NR	NR	<0.005	NR	NR
05VG109	06/29/05	<0.1	<0.005	<0.005	0.13	<0.001	<0.001	<0.005	<0.01	<0.01

NR = Analysis not requested.

Table 35, continued. Blank analysis results (in mg/L) for metals in ground and surface water for the second quarter, 2005.

Sample Number	Sample Date	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
052W116	04/14/05	NR	<0.005	<0.002	NR	NR	NR	NR	NR	<0.005
052W121	06/02/05	NR	<0.005	<0.002	NR	NR	NR	NR	NR	<0.005
05VG109	06/29/05	0.02	<0.005	0.014	<0.0005	<0.01	<0.01	<0.001	<0.001	0.006

NR = Analysis not requested.

Table 36. Blank analysis results for cesium-137, potassium-40, tritium, enriched tritium, gross alpha, and gross beta in ground and surface water samples for the second quarter, 2005. Concentrations are expressed in pCi/L with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).

Sample Number	Cesium-137			Potassium-40			Tritium			Enriched Tritium			Gross Alpha			Gross Beta		
	Concentration	±2 SD	MDC	Concentration	±2 SD	MDC	Concentration	± 2 SD	MDC	Concentration	± 2 SD	MDC	Concentration	± 2 SD	MDC	Concentration	± 2 SD	MDC
052W113	1.4	1.6	2.7	28	42	70	NR	-	-	NR	-	-	-0.3	0.8	1.4	0.5	0.8	1.3
052W114	NR	-	-	NR	-	-	0	70	0.12	30	7	11	NR	-	-	NR	-	-
052W118	0.3	1.6	2.7	-48	46	81	NR	-	-	NR	-	-	-0.1	0.6	1.2	-0.2	0.7	1.3
052W119	NR	-	-	NR	-	-	50	70	0.12	NC[1]	-	-	NR	-	-	NR	-	-
05VG106	-0.3	1.7	2.9	-2	41	69	NR	-	-	NR	-	-	0.2	0.7	1.2	0.1	0.8	1.3
05VG107	NR	-	-	NR	-	-	50	70	0.12	NR	-	-	NR	-	-	NR	-	-

[1] NC = analysis not completed. The result will be reported with the 3rd quarter data.
NR = analysis not requested.

Table 37. Blank analysis results (in mg/L) for common ion and nutrients in ground and surface water for the second quarter, 2005.

Sample Number	Sample Date	Calcium	Magnesium	Sodium	Potassium	Fluoride	Chloride	Sulfate	Total Alkalinity as CaCO3	Total Nitrogen	Total Phosphorus
052W115 & 117	04/14/05	0.2	0.2	3.8	0.4	0.17	<2	<2	10	<0.005	<0.005
052W120 & 122	06/02/05	<0.1	<0.1	<0.1	<0.1	<0.1	<2	<2	<1	0.006	<0.005
05VG108, 109, 110	06/29/05	85	39	137	12	0.33	<2	<2	7	<0.005	0.008

Table 38. Duplicate radiological analysis results (in pCi/L) for ground and surface water, second quarter, 2005.

Analysis/ Sample Location	Original Sample Number	Analysis Date	Concentration	± 2 SD	Duplicate Sample Number	Analysis Date	Concentration	± 2 SD	$/R_1-R_2/$	$3(s_1^2+s_2^2)^{1/2}$	Within Criteria?[1]
Gross Alpha											
Bill Jones Hatchery	052W005	06/16/05	1.6	1.6	052W015	06/27/05	0.7	1.7	0.9	7.0	Yes
P&W-2	052W027	05/18/05	2.4	1.9	052W087	05/23/05	3.2	2.0	0.8	8.3	Yes
ICPP-MON-A-166	05VG036	05/12/05	1.6	2.2	05VG111	05/16/05	9.0	2.4	7.4	9.8	Yes
Gross Beta											
Bill Jones Hatchery	052W005	06/16/05	3.5	0.9	052W015	06/27/05	2.5	0.9	1	3.8	Yes
P&W-2	052W027	05/18/05	1.7	0.9	052W087	05/23/05	1.1	0.9	0.6	3.8	Yes
ICPP-MON-A-166	05VG036	05/12/05	2.6	1.0	05VG111	05/16/05	3.5	1.0	0.9	4.2	Yes
Gamma Spectroscopy Cesium-137											
Bill Jones Hatchery	052W005	06/02/05	0.7	1.5	052W015	06/14/05	-0.2	1.6	0.9	6.6	Yes
P&W-2	052W027	05/03/05	-0.3	1.5	052W087	05/09/05	0.0	1.4	0.3	6.2	Yes
ICPP-MON-A-166	05VG036	04/25/05	-0.5	1.6	05VG111	04/29/05	-0.5	1.4	0.0	6.4	Yes
Gamma Spectroscopy Potassium-40											
Bill Jones Hatchery	052W005	06/02/05	-46	46	052W015	06/14/05	-2	40	44	182.9	Yes
P&W-2	052W027	05/03/05	3	49	052W087	05/09/05	8	48	5	205.8	Yes
ICPP-MON-A-166	05VG036	04/25/05	15	43	05VG111	04/29/05	-54	47	69	191.1	Yes
Tritium											
Bill Jones Hatchery	052W006	06/09/05	-10	80	052W016	06/09/05	-10	70	0	318.9	Yes
P&W-2	052W028	05/24/05	10	70	052W088	05/24/05	-20	70	30	297.0	Yes
ICPP-MON-A-166	05VG037	05/28/05	180	80	05VG112	05/28/05	230	80	50	339.4	Yes
Enriched Tritium											
Bill Jones Hatchery	052W006	08/08/05	3	6	052W016	08/08/05	5	6	2	25.5	Yes
P&W-2	052W028	05/24/05	12	7	052W088	05/24/05	9	6	3	27.7	Yes

[1] $/R_1-R_2/ \leq 3(s_1^2+s_2^2)^{1/2}$

Table 39. Duplicate results (in :g/L) for metals in ground and/or surface water for the second quarter, 2005. Relative percent difference (RPD) is acceptable at < 20 percent. Data are presented in the table in the format of "original result/duplicate result (RPD)."

Sample Location	Sample Number	Duplicate Sample Number	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
P&W-2	052W030	052W089	NR	NR	NR	44/44 (0)	NR	NR	<5/<5 (0)	NR	NR[1]
ICPP-MON-A-166	05VG039	05VG114	900/900 (0)	<5/<5 (0)	<5/<5 (0)	57/56 (2)	<1/<1 (0)	<1/<1 (0)	14/12 (14)	<10/<10 (0)	<10/<10 (0)

NR = Analysis not requested.

Table 39, continued. Duplicate results (in :g/L) for metals in ground and/or surface water for the second quarter, 2005. Relative percent difference (RPD) is acceptable at < 20 percent. Data are presented in the table in the format of "original result/duplicate result (RPD)."

Sample Location	Sample Number	Duplicate Sample Number	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
P&W-2	052W030	052W089	NR	<5/<5 (0)	<2/<2 (0)	NR	NR	NR	NR	NR	60/55 (8)
ICPP-MON-A-166	05VG039	05VG114	595/516 (13)	<5/<5 (0)	29/27 (7)	<0.5/<0.5 (0)	<10/<10 (0)	<10/<10 (0)	<1/<1 (0)	<1/<1 (0)	8/8 (0)

NR = Analysis not requested.

Table 40. Duplicate results (in mg/L) for common ions, and nutrients in ground and/or surface water for the second quarter, 2005. Relative percent difference (RPD) is acceptable at < 20 percent. Data are presented in the table in the format of "original result/duplicate result (RPD)."

Sample Location	Sample Number	Duplicate Sample Number	Calcium	Magnesium	Sodium	Potassium	Fluoride	Chloride	Sulfate	Total Alkalinity as CaCO3	Total Nitrogen	Total Phosphorus
P&W-2	052W029, 031	052W090, 091	44/43 (2)	17/17 (0)	7.7/7.7 (0)	1.2/1.2 (0)	0.31/0.3 (3)	8.3/8.2(2)	26.2/26.2 (0)	146/146 (0)	0.5/0.5 (1)	0.01/0.01 8)
ICPP-MON-A-166	05VG038, 040	05VG113, 115	38/39 (3)	13/13/ (0)	9.6/9.5 (1)	<5/<5 (0)	0.3/0.4 (33)	8.4/8.9 (6)	17.7/17.8 (1)	135/134 (1)	0.2/0.2(2)	0.1/0.1 (15)

[1] Since the result(s) was less than five times the MDL (0.1 mg/L), the duplicate result for this analyte was acceptable at ± MDL.

Table 41. Duplicate *in-situ* radiological measurement results (in :R/hour) for soil, collected second quarter, 2005. Relative percent difference (RPD) is acceptable at < 20 percent.

Sample Location	Analysis Date	Estimated Exposure	Duplicate Sample Location	Analysis Date	Estimated Exposure	RPD
ARA23-H-01	06/08/05	8.45	ARA23-H-01 D	06/08/05	8.37	1.0
ARA23-H-07	06/08/05	8.77	ARA23-H-07 D	06/08/05	8.76	0.1

Table 42. De-ionized water spike results (in :g/L) for metals in ground and surface water for the second quarter, 2005. A percent recovery of 100 ± 25 is considered acceptable and is recorded in parentheses (%R).

Spike Sample Number	Sample Date	Barium	Chromium	Lead	Manganese	Zinc
		Reference Spike Concentration				
		98.0	79.2	7.00	10.3	289
05VG117	04/28/05	101 (103)	84 (106)	7 (100)	9 (87)	251 (87)

Table 43. De-ionized water spike results (in mg/L) for common ions, and nutrients in ground and surface water for the second quarter, 2005. A percent recovery of 100 ± 25 is considered acceptable and is recorded in parentheses (%R).

Spike Sample Number	Sample Date	Calcium	Magnesium	Sodium	Potassium	Fluoride	Chloride	Sulfate	Total Alkalinity as CaCO3	Total Nitrogen	Total Phosphorus
		Reference Spike Concentration									
		21.7	12.8	30.4	5.66	1.03	27.9	7.95	47.2	2.10	0.0250
05VG116, & 117	04/28/05	23 (106)	13 (102)	31 (102)	5.8 (102)	1.05 (102)	27.4 (98)	8.06 (101)	48 (102)	1.97 (94)	0.023 (92)

Table 44. De-ionized water spike results (in :g/L) for select VOCs in ground and surface water for the second quarter, 2005. A percent recovery of 100 ± 25 is considered acceptable and is recorded in parentheses (%R). All results associated with the QC samples are qualified as "estimates (J)" at a recovery of 50-74% or 126-150% if each result is greater than IDL. All results associated with the QC samples are qualified as "rejected (R)" at a recovery of <50% or >150% if each result is greater than IDL.

	Sample Date	cis-1,2-Dichloroethylene	trans-1,2-Dichloroethylene	Tri-chloroethylene	Toluene	Vinyl Chloride
		Reference Spike Concentration				
		3.19	2.50	2.01	4.92	1.12
05VG119	4/28/2005	4.2 (132)	4.1 (164)	3.0 (149)	7.2 (146)	2.3 (151)

Table 45. Electret ionization chamber irradiation results (categorized as spiked samples) for second quarter, 2005. A percent recovery (%R) of 100 ± 25 is considered acceptable.

t #	Exposure Received		Gross Measured Exposure		Background[1]		Net Exposure[2]		%R
	(mR)	Uncertainty (mR)	(mR)	Uncertainty (mR)	(mR)	Uncertainty (mR)	(mR)	Uncertainty[3] (mR)	
S1	29.8	1.49	36.4	1.23	0.2	0.68	36.3	1.41	122%
S2	29.8	1.49	35.1	1.40	0.2	0.68	34.9	1.56	117%
S3	29.8	1.49	34.7	1.39	0.2	0.68	34.6	1.55	116%
S4	29.8	1.49	35.7	1.40	0.2	0.68	35.6	1.55	119%
S5	42.0	2.10	51.7	1.39	0.2	0.68	51.5	1.55	123%
S6	42.0	2.10	49.7	1.39	0.2	0.68	49.6	1.55	118%
S7	42.0	2.10	51.6	1.39	0.2	0.68	51.5	1.55	123%
S8	42.0	2.10	48.9	1.40	0.2	0.68	48.8	1.56	116%

[1] Four EICs were used for control measurements (counted as blanks) and were not irradiated. Background exposure ± 1 SD, as measured by the control group, was 0.2 ± 0.68 mR.
[2] [Gross Measured Exposure] – [Background].
[3] Total propagated error.

Table 46. Air sampling field equipment service reliability (percent operational) for second quarter 2005. These values were calculated by dividing the number of weeks the equipment was in operation by the number of weeks in the quarter.

Station Locations	Sample Type[1]				
	PM_{10}	TSP	Radioiodine	Atmospheric Moisture	Precipitation
On-site Locations					
Big Lost River Rest Area	NC	100%	100%	100%	100%
Experimental Field Station	NC	100%	100%	100%	NC
Sand Dunes Tower	NC	100%	100%	100%	NC
Van Buren Avenue	NC	100%	100%	100%	NC
Boundary Locations					
Atomic City	NC	100%	100%	100%	100%
Howe	NC	100%	100%	100%	100%
Monteview	NC	100%	100%	100%	100%
Mud Lake	100%	100%	CP	100%	100%
Distant Locations					
Craters of the Moon	NC	100%	100%	100%	NC
Fort Hall[2]	NC	100%	100%	100%	NC
Idaho Falls	NC	100%	100%	100%	100%

[1] NC = sample not collected at this location; CP = sample collected using the PM_{10} sampler at this location.
[2] Operated by Shoshone-Bannock Tribes.

Appendix A

Table A-1. Weekly concentrations (in 1 x 10^{-3} pCi/m^3) for gross alpha and gross beta analyses for TSP filters for all locations, second quarter, 2005.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Big Lost River Rest Area	03/31/05	04/07/05	0.9	0.3	20.2	1.0
	04/07/05	04/14/05	1.1	0.3	20.6	1.0
	04/14/05	04/21/05	0.6	0.3	12.8	0.9
	04/21/05	04/28/05	1.0	0.3	25.6	1.2
	04/28/05	05/05/05	1.6	0.3	23.1	1.1
	05/05/05	05/12/05	0.3	0.2	9.8	0.8
	05/12/05	05/19/05	0.4	0.3	18.2	1.0
	05/19/05	05/26/05	0.6	0.3	22.5	1.1
	05/26/05	06/02/05	0.8	0.3	24.4	1.1
	06/02/05	06/09/05	0.4	0.3	14.1	0.9
	06/09/05	06/16/05	0.8	0.3	19.7	1.0
	06/16/05	06/23/05	1.1	0.3	25.8	1.2
	06/23/05	06/30/05	1.1	0.3	24.2	1.1
Experimental Field Station	03/31/05	04/07/05	2.0	0.4	21.1	1.3
	04/07/05	04/14/05	1.3	0.3	21.2	1.0
	04/14/05	04/21/05	0.3	0.3	10.8	0.8
	04/21/05	04/28/05	0.9	0.3	22.9	1.1
	04/28/05	05/05/05	1.1	0.3	23.1	1.1
	05/05/05	05/12/05	0.4	0.2	10.2	0.8
	05/12/05	05/19/05	0.2	0.2	16.3	0.9
	05/19/05	05/26/05	0.5	0.3	17.1	1.0
	05/26/05	06/02/05	0.9	0.3	22.4	1.1
	06/02/05	06/09/05	0.2	0.2	12.7	0.8
	06/09/05	06/16/05	0.5	0.3	18.6	1.0
	06/16/05	06/23/05	1.4	0.3	24.8	1.1
	06/23/05	06/30/05	0.9	0.3	20.5	1.1

Table A-1 continued. Weekly concentrations (in 1 x 10^{-3} pCi/m^3) for gross alpha and gross beta analyses for TSP filters for all locations, second quarter, 2005.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Sand Dunes Tower	03/31/05	04/07/05	0.6	0.2	17.5	0.9
	04/07/05	04/14/05	0.9	0.2	19.1	0.9
	04/14/05	04/21/05	0.2	0.2	11.2	0.7
	04/21/05	04/28/05	0.9	0.2	21.3	1.0
	04/28/05	05/05/05	0.9	0.2	20.4	0.9
	05/05/05	05/12/05	0.3	0.2	9.3	0.7
	05/12/05	05/19/05	0.2	0.2	16.0	0.9
	05/19/05	05/26/05	0.8	0.3	18.1	0.9
	05/26/05	06/02/05	0.6	0.2	18.0	0.9
	06/02/05	06/09/05	0.0	0.3	11.9	1.0
	06/09/05	06/16/05	0.4	0.2	17.2	0.9
	06/16/05	06/23/05	1.0	0.3	23.9	1.0
	06/23/05	06/30/05	0.7	0.2	23.3	1.0
Van Buren Avenue	03/31/05	04/07/05	1.0	0.3	20.0	1.1
	04/07/05	04/14/05	0.9	0.3	22.0	1.1
	04/14/05	04/21/05	0.1	0.3	13.1	0.9
	04/21/05	04/28/05	1.0	0.3	26.3	1.2
	04/28/05	05/05/05	1.0	0.3	25.3	1.2
	05/05/05	05/12/05	0.2	0.2	10.6	0.8
	05/12/05	05/19/05	0.4	0.3	17.9	1.0
	05/19/05	05/26/05	0.7	0.3	19.8	1.1
	05/26/05	06/02/05	1.0	0.3	25.5	1.2
	06/02/05	06/09/05	0.5	0.3	13.9	0.9
	06/09/05	06/16/05	0.6	0.3	19.4	1.1
	06/16/05	06/23/05	1.3	0.3	27.1	1.2
	06/23/05	06/30/05	1.0	0.3	26.6	1.2
Atomic City	03/31/05	04/07/05	0.9	0.3	20.7	1.1
	04/07/05	04/14/05	1.1	0.3	25.6	1.2
	04/14/05	04/21/05	0.6	0.3	16.1	1.0
	04/21/05	04/28/05	0.6	0.3	31.1	1.4
	04/28/05	05/05/05	1.1	0.3	27.4	1.2
	05/05/05	05/12/05	0.5	0.2	12.1	0.8
	05/12/05	05/19/05	0.7	0.3	21.0	1.1
	05/19/05	05/26/05	0.8	0.3	23.7	1.1
	05/26/05	06/02/05	0.9	0.3	27.5	1.2
	06/02/05	06/09/05	0.4	0.3	16.8	1.0
	06/09/05	06/16/05	0.9	0.3	22.4	1.1
	06/16/05	06/23/05	1.1	0.3	30.2	1.3
	06/23/05	06/30/05	1.1	0.3	26.2	1.2

Table A-1 continued. Weekly concentrations (in 1 x 10^{-3} pCi/m^3) for gross alpha and gross beta analyses for TSP filters for all locations, second quarter, 2005.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Howe	03/31/05	04/07/05	1.4	0.3	18.1	1.0
	04/07/05	04/14/05	1.0	0.3	20.2	1.1
	04/14/05	04/21/05	0.2	0.3	12.3	0.8
	04/21/05	04/28/05	1.0	0.3	23.5	1.1
	04/28/05	05/05/05	0.8	0.3	21.8	1.1
	05/05/05	05/12/05	0.2	0.2	9.9	0.8
	05/12/05	05/19/05	0.4	0.3	15.1	0.9
	05/19/05	05/26/05	0.5	0.3	20.2	1.0
	05/26/05	06/02/05	0.6	0.3	22.6	1.1
	06/02/05	06/09/05	0.2	0.2	14.1	0.9
	06/09/05	06/16/05	0.4	0.3	17.3	1.0
	06/16/05	06/23/05	0.8	0.3	25.4	1.1
	06/23/05	06/30/05	0.9	0.3	21.2	1.1
Monteview	03/31/05	04/07/05	0.8	0.3	16.1	0.9
	04/07/05	04/14/05	1.6	0.4	19.1	1.2
	04/14/05	04/21/05	0.2	0.2	11.7	0.8
	04/21/05	04/28/05	0.6	0.2	22.2	1.0
	04/28/05	05/05/05	0.9	0.3	21.4	1.0
	05/05/05	05/12/05	0.4	0.2	10.6	0.7
	05/12/05	05/19/05	0.6	0.3	17.1	0.9
	05/19/05	05/26/05	0.7	0.3	16.6	0.9
	05/26/05	06/02/05	0.6	0.3	22.7	1.0
	06/02/05	06/09/05	1.1	0.3	14.6	0.9
	06/09/05	06/16/05	0.4	0.2	15.7	0.9
	06/16/05	06/23/05	0.9	0.3	22.3	1.0
	06/23/05	06/30/05	0.9	0.3	21.4	1.0
Mud Lake	03/31/05	04/07/05	0.8	0.3	15.2	0.9
	04/07/05	04/14/05	1.1	0.3	18.4	0.9
	04/14/05	04/21/05	0.2	0.2	9.8	0.7
	04/21/05	04/28/05	0.8	0.3	21.0	1.0
	04/28/05	05/05/05	0.9	0.2	20.8	1.0
	05/05/05	05/12/05	0.4	0.2	10.8	0.7
	05/12/05	05/19/05	0.6	0.3	14.7	0.9
	05/19/05	05/26/05	0.9	0.3	18.9	1.0
	05/26/05	06/02/05	1.1	0.3	21.9	1.0
	06/02/05	06/09/05	0.3	0.2	12.6	0.8
	06/09/05	06/16/05	0.6	0.3	17.9	1.1
	06/16/05	06/23/05	1.2	0.3	24.4	1.1
	06/23/05	06/30/05	1.1	0.3	24.1	1.1

Table A-1 continued. Weekly concentrations (in 1 x 10^{-3} pCi/m^3) for gross alpha and gross beta analyses for TSP filters for all locations, second quarter, 2005.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Distant Locations						
Craters of the Moon	03/31/05	04/07/05	0.6	0.3	15.6	1.0
	04/07/05	04/14/05	0.8	0.3	15.7	0.9
	04/14/05	04/21/05	0.0	0.3	10.6	0.8
	04/21/05	04/28/05	0.7	0.3	21.8	1.1
	04/28/05	05/05/05	0.7	0.3	16.9	1.0
	05/05/05	05/12/05	0.2	0.2	9.1	0.8
	05/12/05	05/19/05	0.3	0.3	13.8	0.9
	05/19/05	05/26/05	0.4	0.3	19.1	1.0
	05/26/05	06/02/05	0.6	0.3	20.8	1.1
	06/02/05	06/09/05	0.5	0.3	13.6	0.9
	06/09/05	06/16/05	0.3	0.3	15.7	1.2
	06/16/05	06/23/05	0.8	0.3	20.3	1.1
	06/23/05	06/30/05	0.6	0.3	21.3	1.1
Fort Hall[1]	03/31/05	04/07/05	1.1	0.3	14.3	0.9
	04/07/05	04/14/05	1.2	0.3	16.5	0.9
	04/14/05	04/21/05	0.6	0.3	10.3	0.7
	04/21/05	04/28/05	1.3	0.3	18.2	1.0
	04/28/05	05/05/05	1.8	0.3	17.6	0.9
	05/05/05	05/12/05	0.5	0.2	9.9	0.7
	05/12/05	05/19/05	0.9	0.3	15.4	0.9
	05/19/05	05/26/05	1.3	0.3	15.5	0.9
	05/26/05	06/02/05	1.5	0.3	18.3	1.0
	06/02/05	06/09/05	0.4	0.2	13.8	0.8
	06/09/05	06/16/05	0.7	0.3	15.4	0.9
	06/16/05	06/23/05	1.6	0.3	21.5	1.0
	06/23/05	06/30/05	1.5	0.4	18.6	1.2
Idaho Falls	03/31/05	04/07/05	0.7	0.3	15.2	0.9
	04/07/05	04/14/05	1.8	0.3	22.1	1.1
	04/14/05	04/21/05	0.4	0.3	13.9	0.9
	04/21/05	04/28/05	1.4	0.3	22.5	1.1
	04/28/05	05/05/05	1.1	0.3	22.3	1.1
	05/05/05	05/12/05	0.5	0.2	10.3	0.8
	05/12/05	05/19/05	0.4	0.3	17.3	1.2
	05/19/05	05/26/05	1.0	0.3	18.7	1.0
	05/26/05	06/02/05	0.7	0.3	21.2	1.0
	06/02/05	06/09/05	0.3	0.2	12.8	0.8
	06/09/05	06/16/05	0.7	0.3	18.7	1.0
	06/16/05	06/23/05	1.5	0.3	25.5	1.2
	06/23/05	06/30/05	1.2	0.3	22.8	1.1

[1] Operated by Shoshone-Bannock Tribes.
[2] No sample due to equipment failure.

Appendix B

Table B-1. Weekly concentrations (in 1 x 10^{-3} pCi/m^3) for gross alpha and gross beta analyses for PM_{10} air samples for all locations, first quarter, 2005.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Mud Lake	03/31/05	04/07/05	0.7	0.4	15.0	1.1
	04/07/05	04/14/05	1.0	0.4	22.1	1.3
	04/14/05	04/21/05	-0.1	0.3	10.2	1.0
	04/21/05	04/28/05	0.9	0.4	21.6	1.3
	04/28/05	05/05/05	0.8	0.3	21.6	1.3
	05/05/05	05/12/05	0.3	0.3	10.7	1.0
	05/12/05	05/19/05	0.5	0.4	16.0	1.2
	05/19/05	05/26/05	0.6	0.4	19.4	1.3
	05/26/05	06/02/05	0.5	0.3	22.1	1.3
	06/02/05	06/09/05	0.2	0.3	13.2	1.1
	06/09/05	06/16/05	0.4	0.4	19.2	1.2
	06/16/05	06/23/05	0.8	0.4	25.6	1.4
	06/23/05	06/30/05	1.7	0.6	24.0	1.7

[1] Sampler operation discontinued permanently on 02/24/05.

Appendix C

Table C-1. Results[1] for additional electret locations, second quarter, 2005.

Sample Location	Net Corrected Exposure (uR/h)	± 2 SD (uR/h)
Dubois	16.1	1.9
Hamer	18.5	2.0
Sugar City	18.0	2.0
Blue Dome	14.7	1.9
TAN	18.5	2.0
ICPP I	20.7	2.1
NRF	19.5	2.1
EBR II	18.1	2.0
TRA	20.5	2.1
Grid 3	18.3	2.0
PBF	20.9	2.1
CFA	19.7	2.1
RWMC	19.2	2.0
Roberts	19.0	2.0
Kettle Butte	22.0	2.2
Blackfoot	16.3	1.8
Taber	17.1	1.9
Aberdeen	18.0	1.8
Minidoka	15.9	1.7
Arco	18.2	1.9
Richfield	16.8	1.7
EBR I	18.5	2.0
Reno Ranch	16.8	2.0
Rover Rd. 2.9mi	18.1	2.1
Rover Rd. 4.9mi	19.2	2.1
Rover Rd. 6.3mi	19.0	2.1
Rover Rd. 6.8mi	20.2	2.1
Rover Rd. 8.8mi	18.5	2.1
Rover Rd. 10.8mi	19.7	2.1
Rover Rd. 15.4mi	19.2	2.1
Rover Rd. 17.4mi	19.6	2.1
MP1 - 22/33	21.0	2.1
MP3 - 22/33	18.5	2.1
MP5 - 22/33	17.1	2.0
MP7 - 22/33	17.7	2.0

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table C-1 continued. Results[1] for additional electret locations, second quarter, 2005.

Sample Location	Net Corrected Exposure (uR/h)	± 2 SD (uR/h)
MP9 - 22/33	17.4	2.0
MP23 - 33	16.8	2.0
MP25 - 33	18.4	2.1
MP27 - 33	18.6	2.1
MP29 - 33	16.5	2.0
MP31 - 33	20.2	2.1
MP33 - 33	18.7	2.1
MP35 - 33	16.9	2.0
MP37 - 33	19.0	2.1
MP39 - 33	16.6	2.0
MP41 - 33	19.9	2.1
MP43 - 33	21.2	2.1
Mud Lake - Bank of Commerce	20.0	2.1
MP1 - Lincoln Blvd	20.5	2.1
MP5 - Lincoln Blvd	20.2	2.1
MP7 - Lincoln Blvd	19.0	2.0
MP9 - Lincoln Blvd	19.0	2.0
MP11 - Lincoln Blvd	22.2	2.1
MP13 - Lincoln Blvd	20.3	2.1
MP15 - Lincoln Blvd	19.9	2.1
MP17 - Lincoln Blvd	18.9	2.0
MP19 - Lincoln Blvd	20.5	2.1
MP21 - Lincoln Blvd	16.0	1.9
MP264 - 20	17.4	2.0
MP266 - 20	18.5	2.0
MP268 - 20	21.2	2.1
MP270 - 20	19.5	2.1
MP272 - 20	17.1	2.0
MP274 - 20	15.5	2.0
MP276 - 20	19.5	2.1
MP270 - 20/26	20.4	2.1
MP268 - 20/26	20.9	2.1
MP266 - 20/26	21.1	2.1
MP263 - 20/26	21.2	2.1
MP261 - 20/26	19.3	2.1
MP259 - 20/26	17.4	2.0
Howe Fence-line 1.4mi	16.9	2.0

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Table C-1 continued. Results[1] for additional electret locations, second quarter, 2005.

Sample Location	Net Corrected Exposure (uR/h)	± 2 SD (uR/h)
Howe Fence-line 2.3mi	14.9	2.0
Howe Fence-line 4.2mi	18.7	2.1
Howe Fence-line 6.5mi	19.0	2.1
Howe Fence-line 8.6mi	18.5	2.1
Howe Fence-line 9.7mi	17.5	2.0
Howe Met. Tower	18.1	1.9

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

Appendix D

Table D-1. List of volatile organic compounds (VOCs) analyzed for water verification samples, second quarter, 2005. Minimum detectable concentrations (MDC) are expressed in µg/L.

Analyte	MDC
Benzene	0.5
Carbon tetrachloride	0.5
Chlorobenzene	0.5
1,4-Dichlorobenzene	0.5
1,2-Dichlorobenzene	0.5
1,2-Dichloroethane	0.5
1,1-Dichloroethene	0.5
cis-1,2-Dichloroethene	0.5
trans-1,2-Dichloroethene	0.5
1,2-Dichloropropane	0.5
Ethylbenzene	0.5
Methylene Chloride	0.5
Styrene	0.5
Tetrachloroethylene (PERC)	0.5
Toluene	0.5
1,2,4-Trichlorobenzene	0.5
1,1,1-Trichloroethane	0.5
1,1,2-Trichloroethane	0.5
Trichloroethylene	0.5
Vinyl chloride	0.5
Xylenes (total)	0.5
Bromodichloromethane	0.5
Dibromochloromethane	0.5
Bromoform	0.5
Chloroform	0.5
Bromobenzene	0.5
Bromochloromethane	0.5
Bromomethane	0.5
n-Butylbenzene	0.5
sec-Butylbenzene	0.5
tert-Butylbenzene	0.5
Chloroethane	0.5
Chloromethane	0.5
2-Chlorotoluene	0.5
4-Chlorotoluene	0.5
1,2-Dibromo-3-chloropropane (DBCP)	1.0
1,2-Dibromoethane (EDB)	0.5

Table D-1 continued. List of volatile organic compounds (VOCs) analyzed for water verification samples, second quarter, 2005. Minimum detectable concentrations (MDC) are expressed in µg/L.

Analyte	MDC
Dibromomethane	0.5
1,3-Dichlorobenzene	0.5
Dichlorodifluoromethane	0.5
1,1-Dichloroethane	0.5
1,3-Dichloropropane	0.5
2,2-Dichloropropane	0.5
1,1-Dichloropropene	0.5
cis-1,3-Dichloropropene	0.5
trans-1,3-Dichloropropene	0.5
Hexachlorobutadiene	0.5
Isopropylbenzene	0.5
p-Isopropyltoluene	0.5
Methyl Tert Butyl Ether (MTBE)	1.0
Naphthalene	1.0
n-Propylbenzene	0.5
1,1,1,2-Tetrachloroethane	0.5
1,1,2,2-Tetrachloroethane	0.5
1,2,3-Trichlorobenzene	1.25
Trichlorofluoromethane	0.5
1,2,3-Trichloropropane	0.5
1,2,4-Trimethylbenzene	0.5
1,3,5-Trimethylbenzene	0.5